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Polytechnic Club of the American Institute.

Meeting held at the rooms of the Association, April 13, 1871. The President (Prof. S. D. TILLMAN) in the chair.

THE President read notes of scientific progress, which, with the debate thereon, will be published hereafter.

NEW INVENTIONS.

Mr. N. HOTZ exhibited and explained the Aroma Condenser, for coffee and tea-pots. It consists of a vessel of cold water placed above the coffee-pot, and containing a spiral tube which communicates with the steam from the coffee, and with the open air above the cold water; the steam being condensed in this tube. Care should be taken that the coffee does not boil too rapidly. There should be no perceptible odor from it. If boiled slowly, it will be more than two hours before the cold water will become so heated as not to condense the steam.

Mr. T. D. STETSON—The great point in cooking coffee is to maintain the temperature at boiling heat for a certain length of time. All the steam that escapes is simply superfluous. If we could so manage our fire as to keep up that temperature without producing steam, this apparatus would be unnecessary. If very little steam is made, the water in the condenser will be very slightly heated. But if the coffee-pot were to be placed on a red hot surface, the escaping steam would soon heat the water, and would warm a whole barrel of water. Properly used, this mode of saving the aroma is very successful. Condensers have been made with straight pipes. These would be less effective; but housekeepers might find difficulty in washing out this spiral pipe.

Mr. C. D. BOYLE—A very ingenious mode of cleaning such a pipe was invented by Mr. PALMER, the sculptor. He passed a cord through a series of balls, soft upon the outside, and passed them through the pipe.

Mr. HOTZ exhibited and explained a self-closing faucet, which is durable and proof against injury by frost. A valve is held by a spiral spring upon its seat, with sufficient force to balance the water pressure. A slight pressure upon a lever compresses the spring and allows the water to flow. There is a provision for holding the lever in three different positions, if water is to run slowly or rapidly for a considerable time.

Mr. HOTZ also exhibited a hydrant upon the same principle and general construction.

Also, a hose-pipe, containing two adjoining diphragms with circular openings at one side, so that turning the pipe, by bringing the openings either exactly or partially opposite each other, will regulate the amount of flow.

Mr. OVERTON exhibited veneers of wood cut by a new shingling machine capable of cutting 1,000 shingles per minute from the green log, without steaming or other preparation. The shingles are slightly curved, which is regarded by the inventor as an advantage; for usually shingles are curved upward by exposure to the sun and rain, and these being laid with the concave side down, the curvature resists the tendency to curl up in the ordinary way.

ZINC ORES.

Dr. FEUCHTWANGER exhibited additional specimens of zinc and zinc ore, in further illustration of his paper read at the last meeting. Also, specimens of cadmium and indium, extracted from zinc ores. We have three manufacturing establishments in the United States; and there have been imported in January, February and March of this year 130,000 plates of zinc, each weighing twenty-eight pounds. The manufacture of the white oxide of zinc is now increasing, and we are already beginning to export it to England. It has been found that the painter's colic is produced by working in zinc, as well as in white lead. German silver, which was originally introduced into the United States by Dr. F., is an alloy of copper, nickel and zinc. The nickel coins lately introduced were authorized by the very man who twenty years before had reported against this coinage when proposed by Dr. F.

Mr. GODWIN stated that zinc when used for rain water pipes had been found to decay very soon.

Dr. FEUCHTWANGER—Probably it was too thin. I have had one for twelve years in my kitchen, and it has kept very well.

THE MEDITERRANEAN SEA.

Dr. P. T. VAN DER WEYDE exhibited a map which he had prepared to show the territory drained by the Mediterranean Sea. There are a great many lakes, especially in Asia Minor, in the neighborhood of the Mediterranean Sea, scores of them, which have no outlet, but like the Dead Sea, evaporate all the water they receive. The Mediterranean Sea receives very little drainage, and is in a climate where there is a great deal of evaporation. The Black Sea, on the contrary, is in a region where the rain-fall is much greater than in the United States, and receives the waters from many large rivers; and it has a large surplus of water which it pours into the Mediterranean Sea. In addition to this, the Mediterranean receives water from the Atlantic Ocean, flowing inward through the Straits of Gibraltar, to counterbalance its evaporation.

It is now stated that there is an undercurrent flowing outward through the Straits of Gibraltar. That must be secondary to the main current above; and may be caused by differences of specific gravity, as the currents of air flow in at the top and out at the bottom of the door of a heated room.

Dr. I. S. DIEHL stated that there appeared to be more water discharged at the Delta of the Nile than came down over the cataracts, and asked Dr. V. how he accounted for that.

Dr. VAN DER WEYDE—In the first place I should want to be sure of the fact.

Dr. DIEHL—I cannot give the authority. The French expedition claims to have made this observation.

Mr. HUDSON—Is the current through the Straits of Gibraltar constant and uniform? I should think it would be extremely variable.

THE PRESIDENT—In the winter season the undercurrent is undoubtedly stronger than at other times.

THE LINES IN THE SPECTRUM.

Dr. VAN DER WEYDE—As astronomers have been discovering new asteroids by the telescope, chemists have been discovering new metals by the spectroscope; but thus far we have not kept pace with the astronomers. These new substances are Cæsium, Rubidium, Thallium and Indium. If we transmit the rays of the sun through a prism, we see the seven colors of the rainbow. If the rays are received through a narrow slit, the colors are separated, and dark lines appear in the spectrum. FRAUNHOFER not only discovered these lines, but that they are different in the spectra of stars from those in the spectrum of the sun. It was found by BUNSEN, KIRCHOFF, and others, that these lines are peculiar to certain substances; and they have made elaborate investigations of the lines produced by various substances. But they found some lines they could not account for. In order to determine what produced these lines, they selected, first, certain lines in the blue rays, and by various experiments they found they could remove the substances producing the other lines and at last isolate the substance producing those particular lines. They then found that this substance was a new metal, which, from its lines being in the blue, they called Cæsium. In the same manner they found another substance producing certain lines in the red rays, and that they called Rubidium. These substances resemble potash and soda. Other investigators found Thallium and Indium. There are still lines in the spectrum unaccounted for; and we do not know what new substances may yet be discovered.

The principal lines in the spectrum were indicated by FRAUNHOFER by the letters A, B, C, etc., up to I. But when we came to photograph the spectrum, we found that the red, orange, and yellow rays, with the lines A, B, C and D, could not be photographed. The spectrum commenced in the green, and not only continued up through the blue, but far beyond the blue, and in that portion of the spectrum were scores of new lines. Photography continued the lines K, L, M, etc., up to U, and that is as far as it goes now. It may go farther by and by. In the visible spectrum there are lines which are not luminous, and so in the chemical spectrum there are lines which have no chemical action.

By the thermometer we find that the rays in the blue and green are quite cool; that in the yellow they are warm, in the red they are hot, and beyond the red they are hotter still. Nine-tenths of the rays we receive from the sun are heat-rays, and only one-tenth are light-rays. The question arises whether there are in the caloric spectrum cold lines, as there are dark lines in the luminous spectrum, and as there are lines where there is no chemical action in the actinic spectrum. But the thermometer is not sufficiently delicate to detect such lines. I therefore tried the thermopyle, consisting of bars of bismuth and antimony, the whole instrument being but 1½ inches long, and capable of measuring exceedingly small amounts of heat. I so arranged it, that after setting a wire in the eye-piece of the telescope upon a particular line, the eye-piece could be removed and the thermopyle introduced exactly in the place of the wire. In that way I tested the apparatus upon the lines A and B, and I found in each case that upon moving the thermopyle in either direction, the needle moved, showing a less amount of heat in those lines. I then continued the investigation in the space where we have only heat rays; and I found there also sudden motions of the needle. I found a prominent cold line at the same distance outside of the line A, as that line is from the line D.

This result has been in a most unexpected and most gratifying manner confirmed by experiments of an entirely different nature. BECQUEREL made investigations of fluorescence, which is to light what echo is to sound. Substances put in a strong sunlight were found when removed suddenly into a dark place to glow; and some substances will glow for half an hour or even fifty minutes, while others cease almost immediately. He found that the caloric rays had no effect in causing fluorescence, but that it was caused exclusively by the chemical rays. On the contrary, he found that the heat rays had the power of annihilating fluorescence. Keeping the substance for a single second in the red rays, or in the heat rays beyond the red, the fluorescence was extinguished. After exposing a substance which had been made fluorescent to the spectrum of the heat rays, he found that where the dark lines were, the substance remained luminous, and he thus saw a luminous line as far from the line A in the heat spectrum, as that line is from the line D, that being a cold line which had not the power of extinguishing the fluorescence.

OBSERVATION OF THE SUN.

Dr. VAN DER WEYDE continued—In connection with this subject I will state that a new plan has been devised for getting rid of the heat rays in observing the sun. The rays of light falling upon a right-angled prism in the usual manner are totally reflected. If they fall less obliquely upon the second force of the prism, they will be refracted and pass through. Now the angle at which total reflection takes place depends upon the degree of refrangibility of the light. Consequently, the angle is different for the more refrangible violet rays from that for the less refrangible red rays, or the still less refrangible heat rays. The prism may be so adjusted that the red and all the visible rays shall be totally reflected to the eye-piece, while the less refrangible heat rays will be refracted and pass through the prism. The observer, moderating the light by a colored glass, and relieved of the heat, can observe the sun for hours without inconvenience, receiving only luminous rays.

Mr. BOYLE—I have had a dark glass break by the heat, under my own eye, while observing with a prism.

Dr. VAN DER WEYDE—The angle must be exactly at the limit. If you make the inclination too great, the heat will be totally reflected as well as the light. Looking in the prism at the proper angle, you will see an arc showing the limit of total reflection of light; that arc is the limit, where the caloric rays will pass through the prism, and the luminous rays will not.

Adjourned for two weeks.

Scientific Curiosity Connected with the War Indemnity France is to Pay to Germany.

IN order to give to our readers the real gist of the following, we retain some French words, explaining first that a milliard means a thousand millions. On the 31st of December next, there will not have elapsed a milliard of minutes of time since the beginning of the Christian era; that milliard of minutes will not be complete before the date of 28th of March, 1901. If, consequently, there had been put in a safe a five-franc piece every minute since the beginning of the era alluded to, the indemnity of five milliards of francs would not be paid off in capital—interest exclusive—before midday of the 28th of March, 1901. The five-franc piece has a weight of 25 grms., and the five milliards will, therefore, weigh 25 millions of kilos., a weight which, if loaded on railway trucks, each containing 5000 kilos. (five tons), would require 5000 trucks; estimated in copper, the weight alluded to would be 500 millions of kilos., and would require 100,000 railway trucks for being conveyed. The diameter of the five-franc piece is 37 millimetres; if, therefore, one milliard of these pieces are laid down so as to join quite closely, this would give a length of 37 million metres = 37,000 kilometres, equal to 74 times the distance from Paris to Strasburg, which is 500 kilometres, and more than 32½ times the distance from Paris to Berlin, = 1134 kilometres. It would, therefore, be possible to pave, with one milliard of five-franc pieces, a road from Paris to Strasburg, which road would have a width of 74 five-franc pieces = 2.738 metres; or a similar road might be made from Paris to Berlin, and have a width of nearly 33 of the same pieces, that is, 1.20 metre. In order to cover a surface of a square metre, 730 five-franc pieces are required; one milliard of these pieces will, therefore, cover 136 hectares, 98 ares, 63 centiares; that is to say, nearly three times more than the surface occupied in the Champ de Mars at Paris by the Exposition of 1867, which only occupied a space of 46 hectares, but the indemnity to be paid is five milliard of francs which, put together, would cover a surface of 684 hectares, 93 ares, 15 centiares; that is, fifteen times more than the space occupied by the Exposition just named. When three pieces of five-francs are placed upon each other, the height of the pile is equal to eight millimetres; the height attained by piling upon each other one milliard of these pieces would be 2,666,666 metres, 66 centims., that is to say, if placed edgewise, on the ground, the length would be within 2,666 kilometres, which is very nearly the distance from Paris to St. Petersburg. The kilo. of one and of five-franc pieces contains, in each case, 900 grms. of pure silver.

Independance Belge.

Experiments on Successive Polarisation of Light made by Sir C. Wheatstone.

By W. Spottiswoode, Esq.*

The experiments which formed the subject of this discourse were made by Sir Charles Wheatstone some years ago, but the pressure of other avocations delayed their publication. The term "successive polarisation" was applied by Biot to denote the effects produced when a ray of polarised light is transmitted through a plate of rock crystal cut perpendicularly to the axis. The plane of polarisation is found to be changed on emergence and through a different angle for each homogeneous ray. The introduction of instrumental means for converting the plane polarisation of the ordinary apparatus into successive, or, as it is more commonly called, circular polarisation, and the explanation of the phenomena thence arising, constitute the main purpose of the communication.

Polarised light is distinguished from common light by the presence of certain peculiarities not ordinarily found; but the peculiarities in question cannot be discerned by the unassisted eye, and require special instrumental appliances for detection. A simple mode of bringing light into the condition in question is by allowing it to pass through a plate of the crystal called tourmalin, cut parallel to the axis; and if the light be then examined by causing it to pass through a second similar plate, held parallel to the former and caused to revolve like a wheel in its own plane, it will be found that the intensity alternately diminishes and revives, being zero for two positions 180° from one another, and a maximum for two positions at 90° from each of the former. Thus combination of tourmalins constitute, in fact, a polariscope, which in general consists of two parts, counterparts of each other, the first for bringing common light into the condition in question, in other words, for polarising; the second for examining or analysing the light.

The explanation of this fundamental phenomenon is as follows:

The vibrations upon which the sensation of light depends, may, in ordinary light, take place in any direction in a plane perpendicular to the ray. By the process of polarisation they are all brought into one direction, still, however, perpendicular to the ray; so that throughout the entire ray they lie in one plane. On this account the polarisation here considered is called plane polarisation. There are other kinds of polarisation, such as circular and elliptic, whose names are derived from the curves, or orbits, described by the vibrating particles.

There are also other methods for producing plane polarisation beside that above described; *e. g.*, reflexion at particular angles from the surfaces of transparent media, transmission through parallel plates of glass, etc.; but as they all agree in reducing common light to the same condition, it is unnecessary for the present purpose to allude to them more in detail.

If a ray of polarised light fall upon a plate of doubly-refracting crystal, it is divided into two, whose vibrations lie in planes perpendicular to one another. These rays traverse the crystal with different velocities, and, therefore, emerge with a difference of phase. On entering the analyser the vibrations of both rays are resolved into one plane. If the plane of vibration of the analyser be parallel to one of those of the crystal, one ray will be cut off, the other will be transmitted without change. In any other position of the analyser the transmitted portions of the two rays will interfere so as to produce color; and if the analyser be then turned through 90°, the portion of the original light cut off in the first position will be transmitted, and *vice versa*.

Of this theory the following are the experimental results: If a plate of doubly-refracting crystal, *e. g.*, selenite, be placed between the polariser and analyser, and turned round in its own plane, it will be found that in certain positions at right angles to one another, no effect is produced. These may be called neutral positions. In all other positions the field is tinted with color, which is most brilliant when the plate has been turned through 45° from a neutral position. If the analyser be turned, the crystal remaining still, the color will fade and entirely vanish when the angle of turning amounts to 45°. From this position the complementary color will begin to appear, and will be brightest when the angle of turning amounts to 90°. The color depends upon the thickness of the crystal, so that by a suitable preparation any arrangement of colors may be produced.

So far for plane polarisation. The principle of circular or successive polarisation, as regards the present purpose, is as follows:

If two sets of rectilinear vibrations lying in planes perpendicular to one another meet and combine, the resulting vibration will be curvilinear, whose form and position depends upon the difference of phase of the components. If the second set be in advance or in rear of the first by a quarter of a wave length, the resulting vibration will be circular; but the motion will in one case be direct (like the hands of a watch), in the other it will be reverse.

If two sets of circular vibrations in opposite directions meet and combine, the resulting vibrations will be rectilinear, and the position of its plane will depend upon the difference of phase of the components. If the second set advance upon the first, the plane of resultant vibration will undergo direct rotation; if it recede, it will undergo reverse rotation.

If in such an experiment white light be used, the vibrations of the different component prismatic colors will (on account of their different wave lengths) undergo different retardation; and, consequently, the resulting vibrations will lie in different planes, arranged in prismatic order. The order will be from red to violet, or *vice versa*, in accordance with the law stated above.

If a ray of plane polarised light fall upon a metallic reflector, it is divided into two, whose vibrations are respectively parallel and perpendicular to the reflector; and the latter is retarded behind the former by a difference of phase depending upon the angle of incidence. If the plane of vibration of the incident ray be inclined at an angle of 45° to the plane of incidence, the two rays into which it is divided have nearly the same intensity. At an angle, nearly 45° which varies with the metal employed, but which is perfectly definite, the intensities become accurately equal. And further, if the angle of incidence have a particular value dependent upon the nature of the metal (for silver 72), the retardation will amount to a quarter of a wave length. These two rays, on leaving the reflector, will re-combine, and in accordance with the laws above given, will, in the last-mentioned circumstances become a circularly polarised ray. Lastly, the direction of motion in this circular ray will depend upon the side on which the original plane of vibration is inclined to the plane of incidence; if, when it is inclined on one side, the circular ray becomes right-handed, then, when it is inclined on the other, it becomes left-handed.

Reverting then to the phenomena of double refraction produced by a plate of crystal cut parallel to the axis on a plane polarised ray; let the crystal be placed in such a position that the planes of vibration of the two resulting rays are inclined at angles of 45° on the two sides respectively of the plane of incidence; and let there be interposed between the crystal and the analyser a silver plate at an angle of 72° to the direction of these emergent rays. Each of these rays will, in virtue of the principles enunciated above, be converted by reflexion into a circularly polarised ray; but one will be a right-handed and the other a left-handed ray; and the difference of phase produced by the doubly-refracting plate will be undisturbed by the reflexion. This difference of phase depends, as is well known, upon the wave length; in other words, upon the color of the light. So that the two circular rays will combine to form a plane polarised ray, whose plane of vibration depends upon the difference of phase, *i. e.*, upon its color. And if, finally, the light be then examined by an analyser in the usual manner, we shall have all the phenomena of circular or successive polarisation.

From what has been stated above, it appears that the direction of motion in the two circular rays, and, consequently, the order of colors produced, depends upon the position (to the right or left of the plane of incidence) of the ray which has been most retarded in the passage through the crystal plate. If, therefore, the plate being in a given position, the colors appear in an ascending order, then on turning the plate through 90° in its own plane, or on turning it over about an axis in the plane of incidence, the swifter and the slower rays will change position, and the order of colors will be reversed.

The reversal of the order of color may be exhibited in another way. Uniaxal crystals are divided into two classes; one, called positive (*e. g.*, quartz), in which the extraordinary ray moves more slowly than the ordinary; the other, called negative (*e. g.*, Iceland spar), in which the ordinary ray is the slowest. If, therefore, a plate of quartz placed with its axis at 45° on one side of the plane of incidence give the colors in one order, a similar plate of Iceland spar similarly placed will give them in the reverse order.

The same principles apply to the case of biaxal crystals cut parallel to a plane containing the two optic axes. A ray of plane polarised light transmitted through such a plate is divided into two, whose vibrations respectively bisect the angles formed by the two axes; the line which bisects the smallest angle is called the intermediate section, and the line perpendicular to it the supplementary section; and the order of the colors depends upon the relative velocity of the two rays. In selenite the ray whose vibrations lie in the supplementary section is the slowest; in mica it is the swiftest. Hence these two crystals will, all other circumstances being alike, give opposite orders of color, and may be regarded as positive and negative respectively, like quartz and Iceland spar.

The phenomena by which these principles may be illustrated are very numerous and varied, but are better seen than described.

* Read before the Royal Institution of Great Britain, Feb. 3, 1871.

The Action of Sulphurous Acid on Phosphates.

By Dr. B. Wilhelm Gerland.

The researches which this paper describes lead to the following conclusions:

(1.) An aqueous solution of sulphur dioxide acts upon several phosphates, not by decomposing them, like other strong acids, but by combining with them, forming soluble compounds. Basic phosphates require from 4 to 6, and neutral phosphates 2 molecules of sulphur dioxide for solution. These solutions part less readily with their sulphur dioxide than the simple aqueous solution of the latter, and those of the neutral phosphates more easily than those of the basic phosphates. From some of these solutions the original phosphate can be again obtained, from others a less basic salt; but the decomposition in the solutions of this class does not proceed to the formation of phosphoric acid.

The following phosphates belonging to this class have been examined:

(*a.*) Tricalcium phosphate is abundantly soluble in water and sulphur dioxide. The concentrated solutions undergo a slow decomposition at temperatures above 18° C., and form besides calcium sulphite, dicalcium and monocalcium phosphate. Both concentrated and dilute solutions deposit mixtures or calcium sulphite and dicalcium hydric phosphate by addition of alcohol, by exposure in vacuum, or by boiling under reduced pressure. Boiling under atmospheric pressure, on the other hand, causes the formation of the new compound, tricalcium phosphate sulphite, $Ca_3 P_2 O_8 SO_2, 2H_2 O$, as a crystalline precipitate which is distinguished from the above-mentioned mixtures of dicalcium phosphate and calcium sulphite by its great stability. It claims more general interest as being an active manure and disinfectant. The usual composition of this substance made it desirable to prepare corresponding compounds of other metals; but all attempts in that direction have been unsuccessful.

Dicalcium hydric phosphate is readily soluble in water charged with sulphur dioxide. From the solution the original phosphate can be easily obtained.

(*b.*) Trimagnesium, dimagnesium-, and magnesium-ammonium-phosphate are dissolved in large quantities by water charged with sulphur dioxide; the first two without decomposition, but if an excess of the latter has been used, dimagsium hydric-phosphate is left undissolved. All these solutions have a great tendency to deposit dimagnesium hydric-phosphate in crystals.

(*c.*) Tri- and di- maganese phosphate are very soluble in sulphur dioxide and water. Both solutions give crystals *in vacuo*, consisting principally of dimanganese phosphate, but by boiling, precipitates of trimanganese phosphates are formed.

(*d.*) Copper phosphate is soluble, although in smaller quantity, in an aqueous solution of sulphur dioxide without decomposition. The solution deposits at a summer temperature in course of time crystals of cuprous and cupric-sulphite, and by boiling, cupric phosphate.

(*e.*) Uranium phosphate is very slightly soluble in water charged with sulphur dioxide. The phosphate of the original composition separates again from the solution after the removal of the sulphur dioxide.

(*f.*) Crystals of trisodium phosphate absorb sulphur dioxide in such quantity that it would suffice to convert all the sodium present into sodium hydric sulphite. However, alcohol separates sodium dihydric phosphate from the solution, and less than 5-6ths of the sulphur dioxide are expelled by boiling. The concentrated solution obtained by saturating the crystals with the gas, shows the peculiar phenomenon of separating into two distinct liquids by gravitation; agitation unites these again to a perfectly homogeneous liquid.

(2.) Sulphur dioxide in aqueous solution has no action upon bismuth-, stannous-, stannic-, and metastannic-phosphate.

(3.) Sulphur dioxide and water act upon some phosphates in the same manner as other strong acids by forming a sulphite and phosphoric acid. The phosphates of barium, silver, and lead have been observed to undergo this decomposition.

(4.) Calcium arsenite, calcium arseniate, and cupric vanadate are dissolved like the first group of phosphates, without decomposition by sulphur dioxide and water. The solution of the first forms calcium sulphite by boiling, the second begins soon to deposit calcium sulphate, owing to the reaction of arsenic acid on sulphurous acid, and the solution of the vanadate on boiling deposits beautiful golden colored scales, which are probably, copper vanadite sulphite.

(5.) Calcium oxalate is dissolved, in very minute quantity, by water charged with sulphur dioxide, and is deposited unchanged after expulsion of the gas.

Deep Placer Mining in California.

[Conclusion.]

Iowa Hill and Vicinity.—The town of Iowa Hill is on the summit of the mountain range which forms the east bank of the North Fork of the American river. The interest here is hydraulic washing and cement mining. The hydraulic mining can only be carried on for a brief season in each year, as the four ditches which supply the place, none of which are over six miles in length, will not furnish in the aggregate over 1000 inches of water in the best season—less than is run in one set of claims at Gold Run on the opposite side of the river. Two large cement mills are running—the Columbia, 20 stamps (steam), at Monona Flat, and the Morning Star, 20 stamps (steam), near Wisconsin Hill. The latter claim has 5000 feet on what appears to be a blue lead channel, and has been a profitable enterprise for many years—the owners, however, are somewhat reticent as to their operations, and we can furnish no statistics. Many other milling enterprises have been abandoned, as it is believed most of the ground can be more profitably worked by the hydraulic process when water in sufficient quantities shall be brought in.

The gold product for the past three years, based on purchases and shipments by J. W. Chinn, agent of Wells, Fargo & Co., has been as follows:

1868	$185,000
1869	162,000
1870. (June to October—a very dry season)	69,550
Balance of year 1870—estimated	10,000
	426 550
Add 20 per cent. for dust sold elsewhere	85 310
	$511,860

We have a total product here, allowing for over-estimates, of at least $500,000, and comparing these returns with the limited quantity of dirt washed off, on account of the scarcity of water, we are inclined to the belief that the ground here pays a very high rate per cubic yard—probably over 30 cents. The miners here may well look with anxiety to the completion of the Lake Tahoe Water Company's works, which will give them a steady and unfailing supply of water—the amount of ground here being almost unlimited in extent.

As the ancient river bed known as the Blue Lead is abruptly broken off by the deep cañon of the North Fork, at Indiana Hill, opposite here, and distant not more than two miles in an air line, we might expect to find its continuation on this side of the river. Such is not the case, however; and if it exists, it has not been sufficiently developed to prove its identity. Extensive hydraulic operations at Iowa Hill and Wisconsin Hill seem to favor the theory of a wide expanse of water with

rapid currents, depositing beds of gravel in basins and depressions of the bed rock, rather than to an ancient channel system so plainly indicated on the west side of the river. It is, however, highly probable that the Blue Lead channel of Indiana Hill will be found, as we learn that experienced miners are prospecting for it somewhat higher up.

The Great Cañon of the North Fork.—The scenery of the great cañon of the north fork of the American river is of such grandeur, that in comparison the precipices of Cape Horn, on the Central Pacific Railroad, which is the termination of the deep gorge, seems tame and commonplace. The cañon is ten or twelve miles long, with a depth of from 1800 feet to 2200 feet, rarely exceeding 2000 feet in width. The mountain sides, rising abruptly, and the river winding in serpentine folds, gives the observer with every turn a fresh view, which seems to excel in wildness and sublimity that which he has been gazing on in awe and astonishment. BAYARD TAYLOR thus describes the view of this cañon at its westerly extremity, as presented from the Illinoistown and Iowa Hill trail: "As we approached the north fork of the American, a far grander chasm than any we had yet encountered yawned before us; the earth fell sheer away to an unknown depth (for the bottom was invisible), while a mighty mountain wall, blue with the heated haze of noonday rose beyond, leaning against the sky. Far to the east a vision of still deeper gorges, overhung by Alpine peaks, glimmered through the motionless air."

River mining is still prosecuted on the banks and bars of this stream, principally by Chinese, of whom there are several camps in the great cañon, between Jehovah Gap and Cape Horn. The breakage of the great ancient river whose bed was nearly two thousand feet above the present water level of the American river, has scattered its contents throughout this cañon, where they have lodged against projecting points of the banks and become in the course of time as hardly compacted and cemented as in its original bed. Inclines and drifts are run in these gravel banks, and operations conducted until the raising of the river in winter drives out the miners. At Green Valley, a few miles above the cañon, nuggets of great size—some as large as pigeon-eggs—have been found in abundance in a shaly blue clay, which is described as presenting the appearance of having been the former bed of the American river—running parallel to it and not more than fifty feet above its present bed. These "strikes" are of almost annual occurrence in this locality.

SIERRA COUNTY.

The limited time at our disposal and the lateness of the season did not admit of a visit to this county. For all the information which we possess, which is embodied in the following letter, we are indebted to Mr. E. SPAULDING, for many years County Surveyor of that county, who, in the prosecution of his official duties, has gained an extensive knowledge of the mining resources of Sierra county: "Deep placer mining in this county is principally confined to the Blue Lead, which extends through the county parallel to the main range of the Sierra, and at right angles to the present streams. This body of blue gravel is usually covered several hundred feet deep with volcanic debris, and is about half a mile wide and fifty feet deep. The portion that pays for working is usually about three or four hundred feet wide, and from one to three feet deep, laying on and near the bed-rock. Very little of this deposit has been worked by hydraulic process; the principal method has been to work through tunnels, shafts and inclines. When raised to the surface, the gold is easily washed out of the gravel through sluice-boxes. A few miners are receiving small returns for working portions of the deposit that were once considered worthless, and for working over again portions that paid very large returns for working before. The deposit at the towns of Chips Flat, Alleghany, Wet Ravine and Forest City are mostly worked out. There is about two miles of the deposit between Forest City and Rock Creek that has not been worked, owing to a want of drainage at the Rock Creek end and at the Forest City end, which is owned in small tracts, too small to justify the individual companies in opening it. At present the North Fork Mining Company, an incorporated company, whose place of business is at Forest City, own over a mile of mining ground, and have a tunnel in progress that will strike the deposit at about three thousand feet from the place of beginning. This is one of the most promising mines in Sierra county. The Rock Creek end of the deposit is owned by the Adellia Company—not working. The deposit at the towns of Rock Creek and Monte Christo is worked out. At Fir Cap there are two companies receiving good returns for their work. At Morristown and Cold Cañon the deposit is worked out. At the towns of Howland Flat, Gibsonville and Whiskey, the deposit is wider, and pays less than at points where it is narrow. The width of the deposit and the regular yield gives a permanence to the work being done at these towns, and at present rates of progress it will probably take ten years to work out the deposit. North of the North Yuba river, and parallel to the Blue Lead, and about three miles below or west of it, are located the towns of Eureka, St. Louis and Port Wine. The deposits at these towns have been worked by hydraulic process, and with the exception of about one claim at each town, that will yield good returns for two or three years to come, the deposit is worked out. There is a deposit lying between Middle and North Yuba rivers, and parallel to the Blue Lead, and about eight miles above or east of it, marked by mining camps, among which are the towns of American Hill and Nebraska; this deposit may be considered exhausted. The towns of Pike City, Indian Hill, Brandy City and Scales district, and intervening camps, mark the course of a deposit that extends through the county parallel to the Blue Lead, and about twelve miles below or west of it. This deposit has been principally worked by hydraulic process, and like the great portion of this class of deposit in Sierra county, is worked out."

We are under obligations to Mr. L. E. CRANE, Superintendent of the Alleghany City Gold Mining Co., Alleghany City, Sierra county, for the following:

Smith's Flat, the development and subsequent exhaustion of which as a placer deposit led naturally to hydraulic mining first, and next to the conception and prosecution of the idea of following the gravel into the mountain by means of tunnels, lies to the south of Downieville, Sierra county, about eight miles.

The place was named in honor of the discoverer of the diggings, who, following a ravine up the mountain side from Kanaka Creek, and taking a fortune out as he went, reached a bench formation situated half-way from creek to summit, and opened on the southerly edge of one of the richest placer deposits ever worked in California. This was in 1850-51; and a prosperous mining camp attested the value of the ground during the period of its working. No vestige of the camp remains, but the town of Alleghany—with its outlying suburb, Cumberland—has since grown into, and maintained, its existence in the close vicinity.

The first tunnel which entered the mountain was commenced early in 1853, and was named the "Packard," from Dr. PACKARD, one of its projectors and owners; it still retains its name, and is yet used to work through, the gravel paying fair wages to work again, and an occasional bit of undisturbed ground being discovered and worked very profitably.

The Packard tunnel paid from the start. No assessment, beyond the light contributions necessary to a commencement, were called for, and the owners received large individual fortunes from dividends. This was owing to the fact that no "rim rock" was encountered, but the tunnel was in the gravel of the famous Blue Lead from the time of erecting the first set of timbers. Whether the absence of rim rock may be accepted as conclusive evidence that the Blue Lead debouched from the mountain at this point, winding southerly through Chip's Flat, Minnesota, Moore's Flat, etc., is by no means certain, but no other probable outlet for it has been noticed.

Following the Packard, and stimulated by prospects that were almost certainties, came the "Alleghany," "Pacific," "Knickerbocker," "Bay State," "New York," "Red Star," "Excelsior," "Masonic," "Jenny Lind," "Hooking Bull," "Buckeye," "Blue Tunnel," "Clipper," and other companies—the famous "Live Yankee" penetrating the same mountain, but from the westerly instead of easterly side. The histories of these companies were uniformly the same; the tunnels penetrated the rim rock, the gravel on the front of the lead was worked at great profit, and when the main Blue Lead was reached it was necessary to sink an incline, and effect drainage by means of pumping. This method of working was expensive, difficult, and necessarily far from thorough or exhaustive; yet the yield of gold was enormous, and the mines were considered very valuable by their owners.

From the claims of the "Fremont," "Knickerbocker," and "Masonic," were taken respectively the sums of $40,000, $90,000, and $60,000 in the space of a month, and it was not difficult for any of the claims to procure credit for almost unlimited supplies and money. That every owner connected with either of the tunnels was not greatly enriched, was owing more to the fact that they all became entangled in expensive litigation regarding boundaries, and that much of what might have been profit went to pay lawyers and witnesses, than to any other cause. It is one of the unwritten jokes of the vicinity that, on the occasion of one of these trials of title at Downieville, an honest miner gave testimony descriptive of the situation and course of the Blue Lead. He traced it as far north as that town, and when the attorney asked him, "Where does it go from here?" he replied, "I think it comes right into the court-house here, and don't go no further!"

Not one of these companies worked the ground reached by their tunnels fully out, and the majority of them were far from doing so. Various causes combined to induce cessations of work, mining excitments in distant localities attracted owners away, tunnels became first dilapidated, then ruined, and in 1858-59 the end of exciting rush and competition had been reached, and many of the claims were lying untouched. In several of them, however, work was still done by men who had succeeded to proprietorship, and it was proved that even ground which had once been worked would pay in these days of cheaper supplies and lower wages. In October, 1870, the owners of the "New York" claim discovered a very rich deposit of gravel which had been passed under by the original tunnel when on its course to the channel. The weekly yield from this deposit where it was first opened was 104 ounces ($1,846) from the gravel got out by "four men at the pick." Its extent is not yet fully determined, but enough has been prospected to denote that there is a very large body of it. In 1868 several of the claims, with portions of others, were purchased, and are now being developed and worked by an incorporated company known as the "Alleghany Consolidated Gold Mining Company." A tunnel was projected that should be low enough to afford sure drainage for all the ground it was designed to work, and, indeed, low enough to drain the Blue Lead at any point in the mountain. It was commenced near the starting point of the Blue Tunnel, the course of which it followed for 900 feet, at which point it deviated to the east sufficiently to leave twenty feet between them. In December, 1870, this tunnel was near 2,000 feet into the mountain, and was close in the vicinity of a large body of unworked gravel of the Blue Lead. It is a key to the entire mountain, and there are strong probabilities that it will soon develop into a rich paying claim.

W. A. S.

A New Reservoir for Philadelphia.

IT is proposed to build a new reservoir, covering 106 acres of land, and capable of containing 750,165,688 gallons of water, to increase the capacity of the Philadelphia Water Works.

The Present Condition of the Iron Industry.

THE following article is a portion of the inaugural address of Mr. HENRY BESSEMER, delivered upon his assuming the presidency of the English Iron and Steel Institute, till recently held by the Duke of Devonshire. The address, though long, is too full of valuable facts, suggestions and general information to be curtailed; and hence, though we cannot give it entire in this issue, we intend to complete it in our next:

On entering upon my duties as President of the Iron and Steel Institute, I cannot but feel deeply sensible of the honor you have conferred on me by your election; and, at the same time, I fully recognize my inability to do justice to the occasion, and must therefore entirely throw myself on your indulgence. Among the various manufacturing industries of the world, there is, perhaps, not one possessing so absorbing an interest as the manufacture of iron, whether viewed as a source of national wealth, of social advancement, or in its purely scientific character. The history of its discovery extends far back into the night of time, and is lost amid the imperfect records of incipient civilization. As time rolled on, the production of this valuable metal appears to have kept pace and gone hand in hand with the advancement of the arts both of peace and war, down to the period at which we have now arrived. On the 23d of June, 1869, it was the good fortune of the members of this Institute to listen to a most interesting account of the rise and progress of the iron manufacture, delivered by the noble President in his inaugural address; an account not only touching on its ancient history, but bringing it down by successive steps to the present period. This address, as you will well remember, was also accompanied by statistics both of the home and foreign iron trade, so complete, so interesting and so exhaustive, as to leave no standing ground for me in the same direction. There are, however, some points of interest which have cropped up since that period, which I propose to bring briefly under your notice; after which I must ask you to follow me a little way off the beaten track prescribed by custom in addresses like the present. I say briefly, because I should not like to anticipate the more interesting details of the latest improvements in the iron and steel manufacture, which we may hope to have brought before us by the authors of the various papers to be submitted to your notice.

Among the many important problems still waiting for solution in the malleable iron manufacture, is the process of mechanical puddling, a process which presents so many practical difficulties to its successful accomplishment as to have hitherto heavily taxed the inventive talent and perseverance of many able men, who, though baffled for the time, have returned again to the charge, full of energy and determination. Most of the members of the institute had an opportunity, during their visit to Wales last summer, of seeing the highly ingenious apparatus designed by Mr. MENELAUS, of Dowlais, for this purpose. That such appliances should not have accomplished all that was desired of them, is in itself a standing proof of the difficult nature of the task he had taken in hand. The want of success that has hitherto awaited these efforts in the more to be regretted, because the work of the puddler is one so laborious and so exhausting to his physical and vital powers, as to render it desirable, for every reason of humanity, that hand-puddling should be superseded by mechanical force. The advances made in this direction at the works of M. DE WENDELL, and at other works in France, are most interesting. Through the kindness of Mr. MENELAUS, the committee formed to report on this process will have an opportunity of witnessing it in operation at the Dowlais works, as soon as the apparatus can be got into working order.

While these laudable efforts are still progressing in the mechanical department of the iron manufacture, the chemical side of the question has not been lost sight of. It will be remembered by many present that, in the early part of this century, the various qualities of the iron of different districts were considered as the simple and inevitable result of some radical difference in the iron itself, such as we meet with in different kinds of wood, and in other organic substances. The science of chemistry has, however, long dispelled these erroneous notions, and shown that the simple elementary substance, iron, is precisely the same all over the world, and that the great variety in the quality and properties of this metal, as found in commerce, depended entirely in the quantity and number of other substances retained in combination with it, and hence that it might be possible to produce from every kind of iron ore a pure and perfect metal. The great encouragement which the enunciation of these facts at once gave to the manufacturer, led him to study the best means of purifying and separating from iron the deleterious matters found in combination with it. These efforts have had the happiest results, although we are still very far from the ideal standard of perfection, which contemplates the production of an equally pure iron from all the known ores of that metal. This much, however, has been accomplished; the rule of thumb has given way before the proofs of chemistry, and the iron manufacturer of to-day no longer believes in some occult difference in the nature of the iron he treats, but his well-ordered laboratory furnishes him daily with the quantity and quality of the deleterious matters which his raw material contains, and which, as is now well known, consist chiefly of sulphur, phosphorus and silicon. The latter substance is, for the most part, removed in the refinery and puddling-furnace, but the two former still make a determined stand, and are never, in practice, so completely eliminated as to render the metal as pure as that obtained from ores where these substances are entirely absent.

It is, however, no small point gained that we know the numbers and nature of the enemies we have to struggle with. Such knowledge is said to be half the battle; but the other half is still, I fear, the most stubborn. Among the workers in

this direction is Mr. HENDERSON, of the United States, who proposes to remove these deleterious substances by the employment of fluoric acid in combination with oxygen. I have, however, not yet received any information as to the results obtained by the means proposed. A second competitor in this interesting field of research is Mr. SHERMAN, also an American gentleman, who has been carrying on a number of experiments at the works of Sir JOHN BROWN, at Sheffield, and at other places. The invention, as I understand it, consists in the use of iodine, or its compounds, brought into contact with the metal in the puddling-furnace, or in the Bessemer converter. This problem, on purely scientific or chemical grounds, is one of considerable interest, nor is it less so in a commercial point of view; but, under the latter aspect, it resolves itself chiefly into a question of how far the lower-priced quality of pig-iron can be made to equal the results obtained from the purer brands, and how near the cost of the process will bring up the inferior iron to the cost of the purer qualities at present in the market. On these points I have no information that would warrant me in hazarding an opinion either one way or the other. Further experiments are, however, I understand, about to be made, so as to decide these important questions; in the meantime, we cannot but wish every success to the invention, which, if attained, would be of great commercial value. Without having at all studied the question, it would at first sight appear, that instead of employing so expensive a substance as iodine in its manufactured state, that the half vitrified ashes of sea-weed, which are rich in iodine, might be applied direct to the iron in its first process of manufacture in the blast furnace, or by simply charging in with the rest of the material the requisite quantity of sea-weed in its raw state, or only previously dried. The carbonate of soda, chloride of potassium, and other salts, derivable from the sea-weed, would in any case form an excellent flux, and lessen the quantity of lime required to produce a liquid cinder. It would also appear that the ashes of sea-weed, in the form of powder, could most readily be carried by the blast through the tuyeres into the Bessemer converter at any stage of the converting process. I have found, in my early experiments, that blowing crude American pot-ashes into the metal produces a very liquid cinder; but the tuyeres are more rapidly worn than when air alone is used.

Among the most important improvements lately effected in the manufacture of steel is the development, by Sir JOSEPH WHITWORTH, of the system of casting under hydraulic pressure. The casting of large masses of steel, free from air bubbles, has long been a source of difficulty, owing chiefly to the fact that, at the extremely high temperature of molten steel, a certain quantity of oxygen is absorbed and retained by the metal so long as this high temperature is kept up, but which it cannot keep in combination when the metal is cooled down to the point at which it commences to solidify; hence, when the fluid metal is received in a cold mould, large volumes of gas are given off, some of which becomes entangled in the solidifying mass, and is there retained, forming numerous cells or honeycombs. A similar result is met with in finery iron, when it is "overblown;" carbonic oxide gas is liberated in abundance during the solidification of the plate metal, and gives rise to the peculiar cellular structure so well known. Another defect inherent in steel castings owes its origin to the crystalline structure assumed by the metal in the act of solidification. So long as the metal retains undisturbed the original crystals formed by casting, the mass is only feebly coherent—its tensile strength is less than half that to which it rises when hammered or rolled. It will bend only a few degrees from the straight line without fracture, while its power of elongation is also extremely limited; but if considerable pressure be applied while the steel is passing from the fluid to the solid state, the crystals, which would otherwise become almost independent structures, are united or welded together so perfectly at this high temperature, and in their almost plastic state, as to develop the most perfect cohesion of all parts of the mass, probably more perfect than any subsequent operation of hammering could effect.

In a patent which I obtained in 1856, I described a method of casting steel under hydraulic pressure in iron moulds, a cold wrought-iron plunger being forced into the semi-fluid steel at one end of the mould, through the agency of the hydraulic pressure applied to its opposite end. About the same period, I had observed that in those cases where fluids gave off gaseous matters under ordinary atmospheric pressure, that they were prevented from doing so by increasing the pressure on their surfaces. A familiar example of this action is seen the instant we release the gaseous pressure, by the removal of the cork from a bottle of champagne; and it occurred to me that if I subjected the fluid steel to additional atmospheric pressure, that the boiling of the metal in the mould would be prevented. Thus arose the first idea of casting under the pressure of air, or gases, pumped into a close chamber of great strength, in which the mould and casting were enclosed; but owing to numerous engagements, these inventions were left in abeyance until attention was again called to the subject, a few years since, by Sir JOSEPH WHITWORTH, who, finding great difficulty in making steel castings free from air bubbles, and of sufficient cohesive strength for the manufacture of his guns and projectiles, hit upon the idea of subjecting the metal, while still fluid to the action of a hydraulic plunger, forced into the mould. His experiments in connection with this system of casting have been most successful. Indeed I can bear witness to the extreme soundness of several large cylindrical masses, turned and bored, which were shown to me at his works, in neither of which the most minute flaw or bubble-hole was visible. It was also stated that these simple castings, under pressure, were as strong, or even stronger, than bars of hammered steel.

In justice to Sir JOSEPH WHITWORTH, I feel bound to say that I have no doubt whatever but that he was fully unaware of the existence of my previous invention, at the time he brought forward his system of casting under hydraulic pressure, by which the material now known as "Whitworth metal" is produced. Certain it is, that we owe to him the development and first practical application of this system of casting steel under a pressure transmitted direct to the fluid, or semi-fluid, metal, by a plunger actuated by hydraulic force. It is difficult to estimate the importance of any process by which a malleable metal, stronger than forged iron, might be readily cast at once into the desired form; but it is just this question of form which still presents the difficulty. It will be readily understood that any plain parallel figure like an elongated shot, or a solid cylinder or ingot, may be compressed by a plunger at one end, and a tolerably uniform effect be produced throughout the mass of metal; but it is far different with more complex forms. For instance, let us apply the same force to one end of a loam mould, in which a double-throw locomotive crank is to be cast. In this case, we should have two breaks in the continuity of the column pressed upon; and even if it were possible to prevent those parts of the mould between the throws from being crushed in by the enormous pressure transmitted to the end of the crank, we should infallibly fail from another cause. The plunger would, doubtless, transmit the pressure throughout the whole mass, so long as the metal remained fluid; but this is just the period at which pressure is of little or no use, as a substitute for forging; it is when solidification and reduction of bulk is taking place by cooling, that the force is most needed, to prevent the formation of cavities in the central parts of the mass and to cause the cohesion of crystals, which in other cases is effected by the after process of hammering. It is also obvious that the ram would be totally incapable of transmitting force throughout the contorted limbs of a crank axle while in the act of solidification. Hence in this and in a hundred other required forms the plunger system of transmitting pressure would prove an entire failure. There are also other insuperable difficulties in the way of this system of applying pressure to the general run of castings required in steel; the mould for each article would have to be made of enormous strength, and be only very thinly coated on the inside with clay or loam, to prevent the crushing of these materials and the consequent distortion of the casting; while the iron mould, having only a thin coating of yielding material, would oppose the natural contraction of the masss, which would tear itself to pieces. It however, appears that all these difficulties may be at once overcome by simply using an ordinary mould box, and moulding the article in the common way, a very strong hooped vessel being provided in which the moulds may be placed. The opening by which the metal is run into this vessel may then be closed by a screw plug; an artificial atmosphere of considerable pressure may be gradually generated in the vessel by the combustion of a mixture of anthracite coal and nitrate of soda, ground to fine powder, and producing an uncombustible gas having any desired amount of pressure, and acting in all directions on the casting, but with no more strain on the mould than it would be subjected to under ordinary atmospheric pressure. If by this, or any other means that may be suggested, we could obtain steel or malleable iron castings, free from air bubbles and of great cohesive strength, an immense point would be gained. Those who have seen the beautiful castings in steel produced in Germany, by the Bochum Steel Company, and also those of not less merit produced by Messrs. VICARS & Co., of Sheffield, will fully appreciate the importance of giving to such castings the perfect malleability and cohesive strength of steel forgings.

[TO BE CONCLUDED.]

The Barron Process.

THIS is a new method, and one perhaps not yet beyond the condition of an experiment, but it has at least sufficed for the production of steel of as fine quality as has ever been made by any other means. The whole process consists in exposing malleable iron to the action of gaseous hydro-carbons, at a temperature just below that of fusion. Under these circumstances the iron rapidly and regularly absorbs the carbon of the gas and becomes steel. By the Barron process shapes of iron are converted into steel without change of form, and this is the most satisfactory application of it I have seen. For example, tools or implements of any kind may be molded and cast, these shapes made malleable by the ordinary process, and then by impregnation converted into steel, coming out as scissors, knives, axes, or other implements of the very best quality, with no forging whatever. Whether this method is capable of effecting cheaply the conversion of large masses of iron, is not yet demonstrated, though it is claimed; but from the fact that a piece of iron may by this means be covered with a sheet of enamel or coated with a layer of any desired thickness of steel, while yet retaining the toughness of its iron core, and that by a coating of clay the absorption of carbon may be limited to any portion of the surface acted upon, it is evident that this method is destined to have extensive application in the arts.

The quality of steel made by this process is such as leaves nothing to be desired. With tailors' shears, cast in form, made malleable, and then converted by the Barron process, I have cut Florence silk so nicely as to prove the edge perfect; then with these same shears have cut up sheets of tin and untempered steel; returning to the silk have found the edge wholly unimpaired, and this after a repetition of the trial more than twenty times.

There are various other methods of manufacturing steel, which, if I had unlimited space, it might be well to allude to; but I have already said enough upon this subject to show what activity and progress there is in the improvement of the methods of manufacturing iron, and I have been led to dwell upon the subject, perhaps even now longer than was in good taste, carried away by my sense of the immense importance this industry is to assume in our State, when our resources are properly investigated and brought into use.—*Dr. Newberry, Ohio Geology, Report for* 1870.

The London School of Mines.

THE union of the Royal School of Mines with the Royal College of Chemistry, under the name of the "Science School," has been recommended by the royal commissioners. The building in Jermyn street, now used for the school of mines, is to be given up to the geological survey and to the museum, but the lectures to workingmen are to be delivered as heretofore. Sufficient laboratories and assistants are to be provided for the new science school for giving practical instruction in physics, chemistry and biology; and a course in mathematics is also to be added. The technical branches, such as naval architecture, are to be added to the new school. Further recommendations with reference to the organization and accommodation necessary for the new school, will form the subject of a future report.

Track Laying.

BARON VON WEBER'S new system of track laying and the materials recommended by him, are to be employed upon the Long Island Central (Mr. A. T. STEWART'S) railroad. The rails are to be of puddled steel with iron flanges, 4½ inches high 4½ inches base, and weighing 64 pounds to the yard. The fish-bars are to be of puddled steel, and to weigh 16 pounds per pair. The various parts will be made to stand certain tests, so that the whole structure will, when complete, like the "old deacon's one-hoss shay," have the weakest place as strong as the rest.

MINING SUMMARY.

Colorado.

The Georgetown *Miner*, April 6, has these items of news: Superintendent P. A. SKEAHAN, recently from Argentine, reports that the Belmont lode, on McClellan Mountain, Argentine district, is presenting a fine appearance. The lode is the property of the Pine S. M. Co. There are already 100 tons of first class ore out, waiting transportation, and that as soon as pack trains can get to the mine it will be sent to the mill for treatment. It is the intention of the Company to soon commence stoping in all the tunnels, of which the upper one is 164 feet, the second 160 feet, and the lower one 337 feet long. The vein is capable, with its present development, of furnishing 10 tons of ore per day. The first-class ore carries about 40 per cent. lead, and $200, silver, per ton.

Col. SAYER, who is working the Albro lode, Morris district, is raising some good ore, consisting of galena and copper pyrites. Drifting is now going on, both east and west of the shaft. Some surface ore will soon be treated in his mill, and the erection of concentration machinery is contemplated.

Mr. BATEMAN, who is running the Hiawatha tunnel, Hiawatha mountain, Morris district, is preparing to set the diamond drill at work. He proposes to utilize the water power of Clear Creek to drive the compressors that furnish the air for the drills. He is also mining on the Ground Hog lode, and is taking out some rich gold ore, to be treated at Dr. RAE'S mill.

The Indigo lode, situated on Leavenworth mountain, is yielding rich ore. A lot of first-class mineral, 497 lbs. in all, from this mine, was recently taken to Stewart and sold for $311.61, being at the rate of 62½ cents per pound. One thousand pounds of second-class ore from the same vein was sold at the same time, netting $118, or at the rate of $.36 per ton.

Reports from the Howard lode, in Empire, continue to be of an encouraging nature. The owners of this lode, J. M. SMITH & Co., are now drifting on the vein, which still retains its great width of crevice and abundance of ore. The material now being taken out, surface quartz, intermixed with iron pyrites, is rich in gold; it being estimated that the ore now on the dump, about 25 cords in all, will run fully $200 per cord. Two men are employed in the mine and they extract about one-half a cord of ore per day.

The shaft on the Glen Alpine lode, on Republican mountain, the property of the Alleghany S. M. Co., of Pittsburg, Penn., has reached a depth of about 30 feet, and drifting to the west has been commenced. In this drift there is a pay vein of from 3 to 5 inches of mineral, consisting of galena, oxide of lead, and a slight trace of copper pyrites. It is proposed to drift from the bottom of the shaft out to the surface, and in this way avoid the necessity of any hoisting of rock or mineral. The mine will be opened by drifting to the west, and the topography of the hill will allow of good depth being obtained.

THE GEORGETOWN TUNNELS.

The Central *Register* announces the welcome fact that the Burleigh tunnel, running under Sherman mountain, at a distance of nine hundred and eighty feet, has cut a six-inch vein of galena ore, supposed to be the celebrated Mendota lode. This intelligence, says the Denver *News*, cannot but prove eminently satisfactory to our whole mining community as well as to all who are interested in the development of the silver region about Georgetown. It will restore confidence in tunnel enterprise, which was beginning to wane, and demonstrates beyond a question the depth and extent of the veins which upon the surface have proven so numerous and rich. In the general reviving effect which this announcement will have upon silver mining, we may particularly look for renewed energy in the working of the tunnels. These enterprises were started two years ago and soon created an "excitement." Tunnel sites were at a premium and tunnel stock was in demand. There were, of course, some wildcat schemes among them, but there were some of the enterprises which were genuine, and in which we have ever had great confidence. Mentioning only two or three of the oldest and the earliest, we can name the Burleigh, which has just reached the Mendota lode, and the Marshall, which has reached a distance of about one thousand feet. It has crossed several lodes, but always in lean spots, but it is hoped that something better will be reached when the O. K. lode is cut, which now lies only a short distance in advance. The success of these two tunnel enterprises will demonstrate the value of the system, and give new confidence to all who doubted as well as confound those who predicted failure.

California.

ORE SHIPMENTS.

We occasionally receive letters, says the San Francisco *Scientific Press*, from miners in the interior, making inquiries as to what prices can be obtained for ore in this city. To their inquiries we are obliged to return unsatisfactory answers. The purchasers of ores here are unwilling to publish any price list, partly from the American quality of secretiveness, and par ly from the fact that they fear to bind themselves by any statement which, they think, may be taken advantage of. They say, therefore, when asked, Send the ore to us and we will give the most we can. This state of things is unfortunate in some respects. The miner does not like to trust to the purchaser, and the purchaser cannot trust always to the assays and statements of the seller. We doubt not that the result is that less ore or bullion is sent here than might be sent with profit to both parties. The question then arises as to how we can better the matter—a question which is by no means easy to answer. The miner would gladly have a scale of prices given him by the purchaser—to which the latter is averse. He says that the ores are so different in character, richness, and quality that such a scale cannot be furnished. There is, of course, much force in these objections—all the more that the nature of ores in any given locality is very apt to change in time, especially as the mines are in many instances developed to only a comparatively small extent. Still we think that a general scale might be furnished with advantages to both parties. The smelting works of Saxony publish a very detailed tariff of prices. These are regulated by the ingredients of the ore, and their comparative amounts. The ores are brought in a state of fine powder to the furnaces and there weighed in the presence of a representative of the mine and of one of the smelting works. Three samples are carefully taken at the same time, one for the assayer of each party and one for the government assayer. The latter is merely referee, in case the two assays differ materially, and his decision is final. The system works excellently; but then the circumstances are entirely different from those existing here. A "Nevada miner" asks whether the establishment of a government assay office would not be a "good idea." We are afraid that it would not have the desired results, even if we were sure of having a proper person as assayer, of which fact we cannot be certain until our civil service has undergone the needed reform. At present the buyers and sellers must make the best contracts they can with one another, until a vigorous competition brings a change. We believe that the Auburn Mill at Beno, however, publishes a scale of prices, and we believe that Mr. SELBY and others here would do well to follow the example. During the three months past ended, quite large shipments have been made to this city, as shown by the following table, where we give the amounts for this year and for the corresponding months of 1870:

	ORE.				BULLION.			
	Interior.		South.		Interior.		South.	
1871.	tons.	lbs.	tons.	lbs.	tons.	lbs.	tons.	lbs.
January	225	900	1	1,000	458	1,800	138	1,400
February	166	900	—	—	350	1,900	140	900
March	256	1,000	19	1,000	432	300	176	1,600
	648	800	21	——	1,242	——	455	1,900
Totals	669 tons 800 lbs.				1,697 tons 1,900 lbs.			

Average per month: Ore, 223 tons 266⅔ lbs.; Bullion, 565 tons, 1,966⅔ lbs.

	ORE.				BULLION.			
	Interior.		South.		Interior.		South.	
1872.	tons.	lbs.	tons.	lbs.	tons.	lbs.	tons.	lbs.
January	169	1,660	4	400	—	——	46	900
February	109	250	—	—	—	——	47	1,500
March	119	320	19	200	45	1,000	25	1,000
	398	230	23	600	45	1,000	119	1,400
Totals	421 tons 830 lbs.				165 tons 400. lbs.			

Average per month: Ore, 140 tons 943⅓ lbs.; Bullion, 55 tons 133⅓ lbs.

It will be seen from the above that there has been a gratifying increase, especially in the amount of bullion, which last is due to the erection of smelting works in the interior. Of the bullion, one Nevada company alone shipped at least 526 tons. Of the ore, 330 tons were shipped as "copper ore," and one lot of 8½ tons came from Mexico.

Of the new smelting works which was to have been started in this city, we have heard nothing definite of late, although a lot of land was purchased some time ago at Hunter's Point, and preparations are said to be going on. Mr. SELBY has in the meantime been active in securing ore and bullion, and has contracted with parties in Nevada and Utah for their silver lead. During the last quarter there have been exported from this city 204 tons of silver ore, 70 tons of lead ore 350 tons of copper ore, and 80 tons various. Total, 711 tons. A not unimportant item of our export during the quarter is that of 656⅔ tons of lead to New York.

ORES FROM EASTERN NEVADA.

Since the above was written, we see that the State Mineralogist of Nevada has published his report for the years 1869 and 1870. We have not seen the report itself, but the Sacramento *Reporter* publishes therefrom tables showing the amounts of ores and metal shipped from Eastern Nevada during those years. We take these data and rearrange them in tabular form to suit our columns, giving the amount of ore shipped to California in 1869 and 1870, and the amounts of bullion shipped to the East and to West in 1870:

	Ore ship'd to Cal.				Bullion Shipped in 1870.			
	1869.		1870.		West.		East.	
	tons.	lbs.	tons.	lbs.	tons.	lbs.	tons.	lbs.
January	6	186	382	707	59	1,247	—	——
February	7	796	202	788	160	651	—	——
March	18	—	398	1,641	91	782	112	1,937
April	149	1,266	509	303	46	257	168	794
May	50	848	459	1,327	95	1,346	191	867
June	89	656	480	262	139	246	460	303
July	86	1,000	682	190	153	1,967	388	1,310
August	91	717	640	845	291	700	238	1,243
September	122	1,620	448	1,182	223	490	31	183
October	176	37	1,033	771	154	1,728	241	994
November	362	837	778	593	487	70	131	1,828
December	313	1,562	—	—	—	—	—	—
	1,473	1,535	6,015	609	1,902	1,484	1,964	1,429
Totals	7,489 tons 144 lbs.				3,867 tons 913 lbs.			

The figures, with regard to the ore shipment, "show two interesting facts: First, that about all the ores shipped from Eastern Nevada for reduction comes to California, either to be worked in San Francisco, or to be shipped thence to Europe. The other fact is that the increase in the yield of the mines of Eastern Nevada since the opening of the railroad has been nearly 600 per cent. It will be seen that in 23 months 9,489 tons of ore were shipped, worth on the average at least $100 per ton, or in the aggregate, $948,900." These last figures should read 7,489 tons and consequently $748,900. "During the whole period (1869-1870) only 3,885 lbs. of ore were shipped eastward."

In 1869, 51 tons 485 lbs. bullion are given as shipped West, making the bullion total 3,918 tons 1,398 lbs. "Here we have 3,918½ tons of metal shipped last year," (and in 1869) "worth about $250 per ton on the average, and in the aggregate $979,625. It will be noticed that while the shipments in this direction have been constantly on the increase, shipments to the East have been diminishing since June." In the *Press*, of January 7th, we published a tabular statement of all the ores and bullion received in this city for 1870. By a reference to this it will be seen that the above figures are considerably higher than ours. Our amounts were taken from the books of the Central Pacific Company, and were carefully revised at the end of the year. How the State Mineralogist has obtained his we do not know, but we are inclined to think that ours must be the more correct.

Nevada.

FROM THE PALMETTO DISTRICT.

The Inyo *Independent*, of March 25, contains an interesting correspondence, written by the commander of the military post, established at Palmetto on account of sundry misdeeds committed by the Shoshones of that section. The writer deplores the absence of capital from the district, and says that unless some live man comes along to start a custom mill somewhere near that place, the miners who yet remain will have to abandon the finely developed ledges, and give up in despair the hope as well as the labor of years. He then speaks of the Gold Mountain district, situated some eighteen miles east of Palmetto, and which was discovered some ten years since, but could not be worked on account of the Shoshone hostility. With the arrival of this detachment, all difficulties arising from Indians disappeared—hence as soon as the snow is gone a rush in that direction may be anticipated. These mines are said by those who "know whereof they speak" to be very rich in gold, and there are good silver indications likewise. At the present time gold quartz is the only specialty. Two miners leave Palmetto for the new diggings in a few days, with the purpose of working the rock by arrastra. They have experimented sufficient to satisfy themselves that good wages can be made, even by that slow process. In view of this fact, it is hardly worth while to state that, where good remuneration is obtained by such an ancient mode of working ore, modern appliances would extract a colossal fortune in a short time.

THE LANDER HILL MINES.

The Austin *Reveille*, March 23, says that the mines on Lander Hill are looking better now than at any period within the past two years. The Oregon mine of the Manhattan Company, celebrated for the richness of its ores, promises to yield to its owners a richer harvest of silver bricks than any which has yet been gathered from her depths. Superintendent FROST informs us that the Manhattan Company's mines are in better trim to-day than they ever were, and that the amount of ore in sight is larger than it has been since deep working has been going on. In the Oregon mine alone, at 230 feet deep, a drift is being run on the vein, which is now 130 feet in length, and shows an unbroken face of that concentrated ore which Lander Hill alone contains. A drift is being run at a considerable depth below this, which is on the point of striking the vein, so that the yield of this mine alone will soon go a long ways towards supplying the mill. The prospects in the other mines of the company are also good, and Mr. FROST, who certainly knows whereof he speaks, when Lander Hill is in question, assures us that the prospects of the company have never been better for a prosperous mining season. Besides the Manhattan Company's operations, more or less rich ore is being taken out of all the veins on the hill, those of the Rease River Consolidated Company occupying the first rank after the Manhattan. We do not see what is to hinder Austin from being a live place from this on. Lander Hill continues to yield her ruby ores in increased quantities, and a vast amount of inferior ore is about to be extracted, which will greatly add to the bullion yield and profitably employ hundreds of men, who otherwise would have been compelled to seek other places.

NEW SILVER AND PLACER MINES.

The Carson *Register* of the 11th, gives an account of the discovery of new silver lodes and gold placer mines about thirty-two miles south of Carson, on the east fork of Carson River. Some of the quartz assayed at the Branch Mint from $106 to $175 in silver to the ton. Gold was also found in the new section, and it is thought rich placer diggings will be discovered toward the Sierra Nevada range.

PINE GROVE.

A gentleman, just from Pine Grove, says the Virginia *Enterprise*, states that a very rich vein of gold-bearing quartz has been discovered some ten miles east of that town. Choice pieces taken from the surface have yielded at the rate of $10 to the pound. The lead is only three feet in width, but is well defined and can be traced a great distance—the country rock being granite on one side and slate on the other.

Nevada.

THE JACKSON MINING COMPANY.

The first annual meeting of the Jackson Mining Company was held in San Francisco on the 27th ult. The San Francisco *Bulletin* presents the following condensed report of its operations: The company was incorporated on the 21st of December, 1870, with a capital of $5,000,000, divided into 50,000 shares, of which only 41,668 shares have been issued, the remainder being held for account of some heirs. The claim is at Eureka, Nevada, and the product of the mine is galena ore, of which considerable quantities were taken out during the months of January and February, when from forty to fifty men were employed at the mine and furnaces. During the latter part of February only one of the two furnaces was employed, and even this one has been closed during most of the current month, the ore having been temporarily exhausted, owing to the presence of limestone. The operations, therefore, embrace a period of less than three months, and have been quite satisfactory. The total receipts have been $59,029 from 184 tons lead bullion. This bullion contains more or less gold and silver, and reaches this city in bars, the precious metals being extracted in SELBY'S Refining works. Of the amount sold 155 tons averaged $318 per ton, leaving 29 tons on hand, which is averaged in the receipts at $300 per ton. The disbursements on account of the above operations were $40,311, the chief items being $14,092 for labor, $10,609 for charcoal, $6,613 for freight on bullion, $2,458 for hauling ore, $2,310 for furnace supplies, and $877 for mine supplies. The amount of cash on hand is $18,718. The trustees just elected are as follows: J. D. FRY (President), A. E. HEAD, W. T. LOCKHART, A. K. P. HARMON, and R. F. MORROW; H. C. KIBBE was chosen Secretary, and GEO. B. MCANENY, Superintendent. The stock was first put on the market at $4 per share, from which it advanced to $6, with large sales, but suddenly collapsed, and has lately been selling at about $1 62½. The trouble with galena ore seems to be that it exists only in deposits. It remains to be seen whether these mines in the Eureka District shall be an exception. The Eureka Consolidated are operating in the same section, and have already paid two dividends, one of $1, and another of 75c. per share. There is a good market here for lead bullion, and a large business is being built up in this branch of mining industry.

Idaho.

The *Avalanche*, April 8, has the following items of mining news from Cape District: Chinamen who have been idle during the winter, are now beginning to resume work upon their placer claims. The Argenta Company have finished sinking in their shaft, and are now drifting for the ledge. The Robert Emmet mine continues steadily to improve, and work is being prosecuted with vigor. Many Bull Run miners, who have been wintering here and elsewhere, are now preparing to return.

MINERS WAGES.

It is said that the compensation of those who drill by the foot, as well as those who work by the day in the mines of the Territory, will be reduced the coming spring

FLINT DISTRICT.

It is reported that C. S. MILLER is putting the Rising Star mill in running order, and will start it up before long. BLACK is expected back with new machinery for his mill in a few days.

IDAHO CITY ITEMS.

We gather the following from the *World* of the 6th: After a long and severe winter, winding up with several weeks of variable weather, spring was at length ushered in on last Sunday morning. Water has been turned into two or three of the ditches belonging to the Buena Vista Bar Company, from one of which they have for nearly a week past been supplying water to a company of Chinamen, who are at work on the bar opposite the jail. The Buena Vista Company intend starting their hydraulics on Bonum hill this morning, and, in a week from this time, mining operations will be in full blast all around Idaho city. Efforts are being made to get water through the Big Ditch at the earliest day possible, and in the Alderson and Dunn ditches the water is already running. Within two weeks all the principal companies in the camp will be at work, and our city, at night, will be lighted by the pitchwood fires of the miners, on the bars, hills and gulches for miles around. Quite a number of strange faces are now to be seen on our streets, and the stages from Boise city bring fresh arrivals daily. Miners will, doubtless, be in demand, and sooner or later they will all get employment. From Mr. JAMES CARR, of Quartzburg, we learn that the Gold Hill mill started up last Monday, and that it runs like clock work. The company have over 3,000 tons of ore ready to crush, and are still taking out more. Mr. EISSLER has been engaged in driving the tunnel into his ledge near the Gold Hill, and quartz is looking up in that section.

Montana.

HOT SPRING DISTRICT.

A correspondent of the Helena *Herald*, writing from Washington, March 17, gives the following information in regard to quartz mining in and around that town. He says: G. F. COPE is down on his Pony lode about 300 feet, and has, as near as I can learn, eight inches of quartz. He is running night and day, and is in hopes, as all are, that he will pitch upon the old streak that, in days gone by, panned out so well. F. R. MERK, of Virginia city, has commenced work on the Baez lode, and in a short time we shall, undoubtedly, have some good results to report from this quarter. MALLORY & Co., of the Red Bluff, are busily at work constructing an arastra, which, rumor says, is only a precursor of a mill. I learn that the last run of ore from this lode, in the Merk mill, paid rising fifty dollars to the ton. That is not so bad for the Red Bluff, with a crevice of over two feet. NORRIS & Co. are also building an arastra on Hot Spring creek. HAPGOOD & GOODWIN'S arastras are running steadily, and are returning good results. C. P. BRADLY will start his arastra soon. Other parties contemplate putting up arastras in this district. The Snyder mill, formerly known as the Hobart mill, is pounding on ore from the Red Bluff. As the returns from this mill have always rather exceeded those of other mills (same ore), we may naturally conclude that its present run will be pre-eminently satisfactory to all parties concerned. The mill is now opened by L. P. SNYDER and J. W. HYDE; the latter gentleman having recently purchased a half interest in it from Mr. SNYDER.

Michigan.

THE LAKE SUPERIOR COPPER MINES.

We learn from the Houghton *Gazette*, March 30, that the yield of the Calumet Hecla mines, for March, will be somewhere in the immediate neigborhood of eight hundred tons of mineral. The Clark mine, which is owned and operated by the ESTIVANT Brothers, of France, is reported to be looking better underground than it ever has before. The lode which is being worked out is from four to eight feet in width, yielding a goodly supply of rich stamp and barrel work. As soon as a sufficient quantity of "pay rock" is put upon the surface, means will be taken to stamp it and prepare it for shipment. The *finale* of the eventful history of the South Pewabic Company will be, that the property will pass into the hands of the bondholders, when the latter will probably either sell, lease or work the mine. We have heard, says the *Gazette*, nothing direct from headquarters, but, judging from certain facts which have come under our notice, the above conclusion forces itself upon us.

Arizona.

A letter from Arizona City, March 23, in the *Tucson Citizen*, says that "Castle Dome Mining District is turning out large quantities of ore. The schooner Josephine, bound to San Francisco from Port Isabel, will take back nearly as much freight as she brought down, mostly Castle Dome ore. The Hualpai or Sacramento district, near Fort Mojave, is very rich in lead and silver. The Colorado Navigation Company are to bring down ore from there for $20 per ton, therefore, we may soon look for large shipments from that quarter. It is reported that a party have struck a rich streak of pay dirt some seventy miles from here, up the Colorado. They were taking it out at the rate of an ounce to the tub-full, but as they are on a level with the river, were unable to get out much dirt on account of the water."

Montana.

The *Pick and Plow* says there will be at least 1,200 miners at the Clark's Fork diggings by the 1st of May. It allows that the latest reports from the "El Dorado" have greatly increased confidence and intensified excitement. Mining in the vicinity of Sterling, Madison County, is now said to be in a more flourishing condition than ever before. Bozeman had a narrow escape from being entirely destroyed by fire on the 15th inst. The silver reduction furnaces of Jefferson County are all very busy, and the results are said to be something wonderful.

MARKET REVIEW.

The Coal Trade.

NEW YORK, April 21, 1871.

The event of the week has been the attempt at arbitration of the differences, in the coal regions, by a congress of delegates from the operators and miners, held at Manch Chunk, Pa., on Monday last, with Judge ELWELL as umpire. Beyond a little cross-firing, as is usual at the beginning of the discussion of all important undertakings, and in fact peculiar to the American people, nothing was accomplished. The question of wages was scarcely discussed at all in consequence of the delegate for the Lehigh Region having positive instructions not to treat on that point. Judge ELWELL, after listening two days to a rambling debate, in which either side endeavored to find the weak point of the other, probably for use in the future, delivered the following opinion :

GENTLEMEN : I have not deemed it necessary to make an elaborate report on this question, but have endeavored to meet specificially the points that have been raised by both parties. It is, as you are aware, solely on the control of the mines. I submit the following

REPORT.

First—The right of an owner or lessee and operator of a colliery to the entire and exclusive control and management of his works is guaranteed to him by the law of the land, and is of such an unquestionable character that it ought not to be interfered with either directly or indirectly.

Second—The umpire concurs with and adopts as a correct statement of the law that part of the late proclamation of the Executive of this Commonwealth, wherein he says that "It is unlawful for any person or association of persons, by violence, threats, or other coercive means to prevent any laborers or miners from working when they please, for whom they please, and at such wages as they please; and alike unlawful, by such violence or threats, to deter or prevent the owner or operators of mines from employing whomsoever they may choose to employ, and at such wages as may be agreed upon between the employer and the person employed."

Third—It is the undoubted right of men to refuse to work except upon such terms as shall be agreeable to them : but a general understanding that no person of a particular association of laborers shall work for any operator who has in his employ a member of such association who has not paid his dues to the association or who does not belong to such association, is contrary to the policy of law, and subversive of the best interests of the miners and their employers. An association may inflict fines upon its members for breach of its by-laws and expel for non-payment, but it has no right by combined action to place the defaulter in the light of an outlaw in the transaction of business with others.

Fourth—The umpire decides that it is contrary to the spirit of the law, as stated secondly above, for a body of men to agree not to work, because their employer refuses to employ a particular person or because he has discharged such person.

If such a case arises where the act of the operator is deemed to be oppressive, and he refuses to redress the wrong, it it is a proper one for local arbitration, by which in most cases, the difficulty could be properly settled without the disastrous consequences arising both to the employers and employed by a strike, even at one colliery.

Fifth—As persons of sound mind and competent age permitted by law to bargain for themselves, their contracts in regard to labor at mines should be held as sacred as other contracts, and should not be annulled or set aside in any manner different from that provided for other cases. Interference by persons not parties to the contract is not to be tolerated.

Sixth—Operators ought not in any manner to combine against persons who belong to the Miners' and Laborers' Benevolent Association. Any operator who refuses to employ a person because he is so connected, or who shall discharge him for that reason, would thereby give good grounds for censure and for other members to refuse to work for him.

Seventh—No member of the Miners' and Laborers' Benevolent Association ought to be deprived of work because of his being selected by his branch to perform the duties mentioned in section three, article sixteen of the by-laws of that association, if his duties are performed in the manner herein mentioned.

Eighth—In regard to the right claimed by the miners to cease work when they see cause, whether in a body or otherwise, it is impossible to lay down any rule. And I am not aware that it is expected of me to do so. But I may be allowed to recommend that after resumption again takes place and business is again moving in its accustomed channel, that immediate steps be taken to provide for the adjustment of difficulties if any shall arise in future before they reach the disastrous proportions of those which now afflict not only the laborers and operators, but the whole country.

Ninth—Whenever is stated in the foregoing report that an act is unlawful, is censurable, or ought not to be, it is to be understood in the same manner as if the umpire had awarded that such act shall not be done nor allowed by either of the parties represented in this arbitration. WILLIAM ELWELL, Umpire.

Manch Chunk, April 19, 1871.

This is very well as far as it goes, and we hope they will be accepted by both parties, but we doubt, after the temper displayed, whether either party will obey them when its suits their purpose to repeat the unlawful acts which Judge Elwell condemns.

The Judge deserves great credit for such an erudite and unbiased opinion. The public has now been told again by an unprejudiced party the very things that the operator and miner have been preaching to them for months past, but which they would not believe, inasmuch as the sources from which it emanated did not seem unbiased by individual interests. The operator seeks no advantage of the miner, and is, we believe, willing to recognize him in all business transactions as far as consistent with the good management and success of his mining operations; that the advice of practical miners and laborers in the working of a mine, if not in the financial department, is necessary and required there is no doubt, and, perhaps, if the wealthy owner of mines had called in a few of his laborers for consultation in regard to the present suspension, the difficulties would long since have been arranged and a great many stupid blunders have been avoided. The same might be said of the miner and laborer. He does not always consult the best interests of the capitalists, and from indifferent information relative to the intricate laws of financial management may easily involve his employer in great embarrassment.

As to the question of wages, it is manifestly unfair to insist that they shall be the same in all districts. One of the representatives of the miners said it was the misfortune of the Schuylkill operators if they had invested their capital where it did not pay so well as elsewhere; wages should not be lower on that account. Why is it not equally the misfortune of the Schuylkill miners to invest their labor where it does not pay so well as elsewhere? And to what does this sort of talk tend, if not to the complete destruction of the Schuylkill mining industry?

The question of interference in the management of the mines, particularly in relation to the discharging of incapable workmen that may or may not be members of the M. and L. Association, we consider unnecessarily magnified; the Miners' Association supports no drones, and we do not believe have insisted upon the employment of a workman by an operator who was a positive loss to the operator, from inefficiency, or a disgrace to him in consequence of immoral practices. As we understand the principles of the order, good workmanship, temperance, brotherly love, good will, industry and a high regard for the laws of the country, are paramount with them, and, as we remarked in a previous issue, the general good behavior and absence of vandalism in this strike, (which have not been the characteristics of previous strikes), shows the beneficent influences of the principles of the association. In fact, it must be apparent to every member of the association, that only by such deportment can they obtain the recognition they desire in the community, and which is necessary to hold the confidence of not only their employees but the general public. The idea that any honorable operator would discharge a good workman because of his being a member of the association, is equally preposterous, and is not worthy of a minute's reflection. It has been stated that the avowed purpose of the present combination among the operators and railroad companies was the breaking up of the Miners' Association and the prevention of future strikes. Can any one conceive an idea more silly, and yet it is a fact. From the time that the first strike took place, which we believe was nearly a century ago, (about 1780, in London), there is evidence that they have been generally successful, or they would not have been handed down to us as they have been from generation to generation. Failures are not apt to be. Strikes will take place till the end of the world, and we believe that no combination of thirty thousand or forty thousand men can be destroyed; the advantages of trades unions and other combinations of workmen are in any country palpable, and under a Republican government they are greatly augmented. That the miners would be successful in this strike, we have maintained from the beginning—and we have urged upon the capitalists that the sooner they recognized the fact and made some settlement of the differences, the more profitable it would prove, and we are yet convinced of the truth of our original opinion. It is from the fact that strikes are profitable and popular among the workingmen, that arbitration is not favorably received by the miners and laborers in the present coal strike. A regularly constituted board of arbitration would take from them the privilege of striking at some future time, when occasion, in their opinion, demanded it, and this they are not willing to give up.

PRICES.—Cumberland coal is coming to market in immense quantities, and, until the consuming community become more familiar with its peculiar advantages, will hardly be taken up as fast as received; in consequence of a glut in the market prices are ruling very low. We quote this coal at $6 25 to $6 75, along side.

ANTHRACITE COAL.—There is a sufficient quantity coming to market to satisfy a limited demand at the current rates. Dealers are chary about buying.

The effect upon the market by the Manch Chunk meeting was varied. The first news caused some excitement, and lower quotations was the rule. The rates asked for Lehigh coal are: Lump and Steamer, none in the market; Egg, do.; Stone, $10 75; Chestnut, none:

Wilkesbarre, Lump, Steamer, Broken, and Egg, $8 25 to $8 50; Stone, $9 to $9 50; Chestnut, $8 25, on board at Hoboken.

FREIGHTS.—There is very little coal selling, and freights are very low. Captains are willing to take almost anything that is reasonable. We quote harbor freights, 45 to 50 cents; New Haven 90c. to $1 00; Bridgeport, 90c. to $1 00; Providence, $1 30 to $1 40; Boston, $1 50 to $1 65.

Anthracite Coal Trade for 1870 and 1871.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending April 15, 1871, compared with week ending April 16, 1870.

COMPANIES.	1870. WEEK.	1870. TOTAL.	1871. WEEK.	1871. TOTAL.
Phila & Reading R. R.	26,387	798 054	11,744	646 541
†Schuylkill Canal	3,934	63,351	5,791	51 332
Lehigh Valley R. R.	57 546	916.637	12,957	419 029
Lehigh & Sus. R. R.	18,615	239.635	13,609	103.344
" Lehigh Canal	13 111	19.867	2.3	3.3
Scranton North	12.001	178.464	....	....
" South	37,5 4	482.682	....	....
Penn. Coal Co., rail	26.884	273,519	31	3,566
" " " canal	....	....	236	236
Del. & Hud. Canal Co.	56,806	65,445	2,5.0	2,50
" East	6,812	139,932	....	51,511
" " West	1,527	26,525	....	12,74
South	7,524	75,766	....	....
Shamokin	7,969	80,538	19,062	145,019
Trevorton	2,333	70,093	....	....
Lykens Valley Coal Co.	72	72	2,065	16,699
Wyoming South	....	....	....	....
Wyoming North	....	....	....	....
P. N. Y. C. & R. R. Co.	7,911	89,404	360	35,302
Williamstown Col'y	6,102	69.019	....	....
Big Lick Col	1,740	2.213	3,130	25,976
Total	284,943	3,581 240	71,738	1,514,048
1870	71 738	1,514,048		
Decrease week and yes	223,205	2,067,192		

* Less coal transported for Company's use and Bituminous coal.
†Closed for the season.

Bituminous Coal Trade, 1870 and 1871.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending April 15, 1871, compared with week ending April 16, 1870.

COMPANIES.	1870. Week.	1870. Year.	1871. Week.	1871. Year.
R. & O. R. R.	19.755	189,338	30 576	282.272
C. & O. Canal	15,141	28 201	19,942	88 218
Cumberl'd Branch	1.154	17 558	1,144	21,084
" Canal	4,089	7,462	5.717	27,688
H. & B. T. R. R.	8,207	74,223	9.060	91,198
Harrisburg & D.	14,267	161.830	11,794	152,373
L. V. R. R.	....	4,292		12,734
P. & N.Y.C. & R. Co.	3,852	59,759	5.688	81,635

Total

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad during the week ending Saturday, April 15, 1871 :

From St. Clair	
" Port Carbon	972 03
" Pottsville	428 04
" Schuylkill Haven	1,006 00
" Auburn	2,849 13
" Port Clinton	6,514 00
" Allentown and Albertis	25 00
" Harrisburgh and Dauphin	20,254 12
Total paying freight	32,068 12
Coal for Company's use	4,213 04
Total for week	36,281 16
Previously this year	760,629 17
Total	796,911 13
To same time last year	997,840 03

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, April 15, 1871.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	2,011 05
" Port Clinton	3,780 00
Total for week	5,791 05
Previously this year	45,510 17
Total	51,301 02
To same time last year	53,351 13

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, April 8, 1871.

BY RAILROAD—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB VAL. BRANCH.

	Tons. Cwt.
From St. Clair	
" Port Carbon	972 03
" Pottsville	428 04
" Schuylkill Haven	1,006 00
" Pine Grove	1,260 05
" Tamaqua	6,514 00
" Harrisburg	45 03
" Dauphin	5,725 13
Total	15,951 07

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	
" Mill Creek "	
" Schuylkill Valley Scales	754 01
" Mt. Carbon "	299 07
" Cres-ona "	1,257 17
" Pine Grove "	
" Tamaqua "	4,375 12
Total	6,716 17

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	3,911 03
" Shamokin	8,199 15
" Herndon	
Total	12,110 18

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	762 03
" Lebanon & Pine Grove Branch	727 16
Total	1,489 19

CONSUMED ON LATERALS.

From Frackville Scales	91 10
" Mill Creek "	449 02
" Schuylkill Valley Scales	353 10
" Mt. Carbon "	53 10
" Cres-ona "	45 18
" Pine Grove "	18 00
" Tamaqua "	233 05
Total	1,323 17

LEHIGH AND WYOMING COAL.

Received via Allentown, E. Penn'a br.	25 00
" " Albertis, " "	
" " Plymouth R. R., G. & N. Br.	
" " Connecting R. R.	
" " Willow Street R. R.	
Total	25 00

BITUMINOUS.

From Harrisburg	14,420 15
" Connecting R. R., G. & N. Br.	
" Junction R. R.	177 05
Total	14,598 00

COAL FOR COMPANY'S USE.

Anthracite	4,004 17
Bituminous	286 01
Total	4,290 18

RECAPITULATION.

	Total for Week.	Corresponding week last Year.	
Passing over Main Line and Leb. Val Branch	15,951 07	27,090 13	d11,148 06
For Shipment by Canal	6,716 17	2,138 15	14,578 01
Shipped Westward via Northern Central R. R.	12,110 18	1,816 17	i 10,294 01
Shipped West or South from Pine Grove	1,489 19	309 03	i 1,180 16
Consumed on Laterals	1,191 05	1,563 04	d 371 19
Lehigh and Wyoming Coal	25 00	2,754 11	d 2,729 11
Total Anthracite paying fr'gt	37,485 06	35,6 2 04	i 1,803 02
Bituminous	14,598 00	10,106 09	i 4,491 11
Total of all kinds paying fr'gt	52,083 06	45,788 13	i 6,294 13
Coal for Company's use	4,290 18	2,486 13	i 1,794 02
Total Tonnage for Week	56,374 04	48,2-5 09	i 8,088 5
Since Dec. 1, 1870	957,151 13	1108,000 07	d150848 14
Total to date	1013.52517	1156285 16	d142759 19

SHIPPED BY CANAL.

	Total for Week.	Corresponding week last Year.	
From Schuylkill Haven	2,011 05	2,305 15	i 3,700 00
" Port Clinton	3,780 00		d 294 10
Total Tonnage per Week	5.791 05	2,305 15	d 3,485 01
Since Dec. 1, 1870	45,510 17	51,209 18	d5.699 01
To al to date	53,302 02	53.515 13	d2,213 11

Report of Coal forwarded by Pa. & N. Y. R. R. Co., for week ending April 15, 1871.

	BITUMINOUS. Tons.	BITUMINOUS. Cwt.	ANTHRACITE. Tons.	ANTHRACITE. Cwt.
By Rail	5,688 06		360 08	
Previously this year	75,947 00		34.94. 14	
Total by Rail	81,635 06		35,302 02	
By Canal	.....		.....	
Previously this year	.....		.....	
Total by Canal	.....		.....	
Total for the year	.....		.....	
To the same time last year	59,759		89,404 07	
Increase	21,876 06		d54,102 05	

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending April 8, 1871—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1871.. tons ct	WEEK 1870. tons ct.	YEAR 1871 tons cwt.	YEAR 1870. tons cwt.
Wyoming Region	15357 10	28813 04	94206 10	248333 08
Upper Lehigh Region		3891 03	4614 06	22613 05
Beaver Meadow Region		3557 15		5814 14
Hazleton Region		5.65 09	1120 17	10120 05
Mahanoy Region				
Trescow Region			1043 03	
Mauch Chunk Region	557 08		196.5 12	30089 18
Totals	15914 18	41827 11	102640 08	316991 05
Increase	25912 13		196350 17	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	13869 10	18675 07	203344 04	239653 09
Forwarded East of Mch Chunk by Canal	203 09	13111 04	203 02	19867 02
Delivered at and above Mauch Chunk	1957 01	1137 13	14563 03	10684 06
Delivered to L. & B. R. R. at Plymouth Bridge		7601 04		39401 08
L. V. R. R. at Packer'n	145 05	1302 03	2539 19	7385 11
Totals	15914 18	41827 11	120640 08	316991 05
Of the above there was transported on acc'nt of L. C. & N. Co.	557 08	1622 02	20891 19	44467 02
W.-B. C. & I. Co.	13700 10	9631 06	74183 07	91928 12
Totals	14257 14	11242 08	95075 06	136395 14
Increase	3015 0			
Decrease			41329 08	

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending April 15, 1871, and previously this season, compared with same time last year :

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt
Total Wyoming	581 13	72.696 01
" Hazleton	2,424 19	214.265 01
" Upper Lehigh		442 06
" Beaver Meadow	36 02	75,248 15
" Mahanoy	10,996 03	121.285 06
" Mauch Chunk	79 15	2,091 15
Total Anthracite	14,118 14	486,029 06
Bituminous Coal from all sources		12,734 00
Total by rail and canal	14,118 14	498,763 06
Same time last year	75,147 05	1,0.2,916 19
Increase		
Decrease	61,028 11	554,153 13
Forwarded East from Mauch Chunk by rail	12,957 12	419,029 08
Same time last year	57,546 08	916,637 07
Increase		
Decrease	44.588 16	497,607 10

RECAPITULATION.

Forwarded East from Mauch Chunk by rail	12,957 12	419,029 08
To N. C. R. R., at Mount Carmel		18 00
Forwarded North from L. & B. Junction	360 08	35,237 08
To L. & B. R. R. at Packerton for rail	6 01	2,259 15
Delivered at M'h Chunk		
Delivered on line of road above Mauch Chunk	74 01	393 15
Delivered above Mauch Chunk for use of L. V. R.R.	580 00	3,682 12
To L. & B. R. R., at Penn Hav., for railroad		15,539 18
Do. for canal	36 02	94 10
At M. Chunk for canal	104 10	7,697 01
Total Anthracite	14,118 14	2,656 19
Bituminous Coal		468.029 06
Total all kinds	14,118 14	12 734 00
		498,763 06

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending April 15, 1871.

	1871. WEEK.	1871. YEAR.	1870. WEEK.	1870. YEAR.
By Railway	31 04	3,566 08	26,884 06	273,519 09
" Canal	— —	— —	236 00	236 00
Total	31 04	3,566 08	27,120 06	273,755 09
Decrease 270,186 12 tons.				

Delaware and Hudson Canal Company.

The following is a statement of Coal transported by the Delaware and Hudson Canal Co., for the week ending April 15, 1871.

	WEEK.	SEASON.
By Del. and Hud. Canal	2,500 00	2,500 00
By Railroad East		51,511 09
" West		12,72. 00
" South		
TOTAL TONS,	2,500 00	66,731 00
For the same period last year.		
By Del. and Hud. Canal	56,805 00	65,445 00
By Railroad East	6,672 00	139,952 00
" West	1,547 00	26,5.3 00
" South	7,524 00	75,7o6 00
TOTAL TONS,	72,728 03	307,686 00

Shipments of Cumberland Coal

for the week ending Saturday, April 15, and for the year 1871 :

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M	.....	.....	.....
Borden	2,987 05	2,327 01	5,335 06
Consolidation	6,221 06	7,537 17	13,759 03
Spruce Hill	468 04	.....	468 04
Midlothian	1,550 04	2,031 13	3,581 17
H. and Baltimore	.....	2,050 09	2,050 09
do Va M	1,752 15	.....	1,752 15
V C & I Co	.....	.....	.....
G. C. C. and I	3,038 07	1,308 11	4,349 18
Big Vein	2,894 12	.....	2,894 12
Maryland	3,158 10	6,333 11	94 92 01
American	1,972 03	4,071 08	6,043 11
Atlantic	1,286 17	.....	1,286 17
Piedmont	1,956 00	.....	1,956 00
Swanton	1,296 00	.....	1,296 00
Barton	980 00	.....	980 00
Potomac	1,791 15	.....	1,791 15
George's Creek M. C.	.....	.....	.....
Franklin	2,129 05	.....	2,129 05
Total week	33,474 03	25.660 10	59,13 13
Previous	305 473 04	90,245 09	395,719 13
Total year	338 947 07	115,906 19	454,854 06

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, April 21. R. A.	W. A.	AT PHILADELPHIA, April 19. R. A.	W. A.
Lump	$— —	$— —	— —	— —
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	— to —
Egg	8 25 to 8 50	— to —	— —	— to —
Stove	9 00 to 9 25	— —	— —	— to —
Chestnut	8 50 to	— —	— —	— to —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	— —	— —	— —	— —
Broken	— —	— —	— —	— —
Egg	9 00	9 00	— —	— —
Stove	10 25	10 50	— —	— —
Chestnut	9 00	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	8 00	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	7 50	— —	— —
Honey Brook, Leh	W. A.	9 00 to 10 50	— —	— —
Spring Mountain	"	9 00 to 10 50	— —	— —
Sugar Creek	"	9 00 to 10 50	— —	— —
Sugar Loaf	"	9 00 to 10 50	— —	— —
Old Comp'y's	"	9 00 to 10 50	— —	— —
Cross Creek	"	6 00 to 10 50	— —	— —
Room Run	"	— —	— —	— —
Girardville	"	— —	— —	— —
McMichael	"	— —	— —	— —
Shamokin	"	9 50	— —	— —
Lykens Valley	"	— —	— —	— —
Broad Top	"	9 50	— —	— —
Hill & Harris	"	— —	— —	— —
Henry Clay	"	— —	— —	— —
Powelton	"	9 50	— —	— —

[*Dealers in these coals may be found in our advertising columns.]

Company Coals.

April, 1871.
No quotations during strike.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	—	—	—	—	—	—
Pittston at Weehawken	—	—	—	—	—	—
Lackawana at do	—	—	—	—	—	—
Wilk'b're at Hoboken	8 50	8 25	8 25	8 50	9 25	8 25
Old Co. Lehigh at Pt. Johnston	—	—	—	—	—	—
Lehigh at E. Port	—	—	—	—	—	—

For freights to different points see "Freights."

Prices for Coal at Mauch Chunk.

April, 1871.

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein...f.o.b. at Phila..$ — —
Lemon " " " .. — —
Cumberland Vein Coal.. — —
Consolidation Coal Co.'s on board ..... N. Y.. 6 75
Maryland Coal Co. " " .. 6 75

Prices at Baltimore—April, 1871.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load.....$— —@— —
Pittston and Plymouth, do..... — —@— —
Shamokin Red or White Ash, do..... — —@— —
Lykens Valley Red Ash, do..... — —@— —
Zerba Valley..... — —@— —
Treverton..... — —@— —
By retail, all kinds per ton of 2240 lbs..... — —@— —
Georges Cre k & Cumberland f. o. b. at Locust Point for cargoes..... 4 75@4 85
Fairm't and Clarksburg gas, f. c. b. at L. Point 6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

April, 1871.

George's Creek and Cumberland f. o. b. for shipping..$4 30

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes ..$— —@— —
Lykens Valley..... — —@— —
Shamokin Red or White Ash..... — —@— —
Trevorton and Zerba Valley..... — —@— —

Prices of Gas Coals.

April, 1871.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y.

	Duty, $1 25, gold	Coarse	Slack.
Block House		$1 75 @—1 75	
Gowrie		1 75 @—1 75	

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse	Culm of Coal.
Pictou	$2 25 @1 25	
Sydney	2 25 @— 80	
Lingan	1 60 @— 80	
Little Glace Bay	1 60 @1 00	
Caledonia	1 60 @— 80	

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Currency.
Westmoreland	7 10 @7 25
Fairmount Gas Coal Co. of N. Y.	7 50 @— —
Despard Coal Co	$7 50 @— —
Penn	7 75 @8 00
Newburg Orrel Gas	— — @— —
West Fairmount Gs Coal	8 00 @— —

AT PHILADELPHIA.

Powelton..... .....$7 75

Prices of Foreign Coals.

April, 1871.
Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street New York.

Liverpool Gas Caking	$ 9 00@— —
" " Cannel	11 50@12 50
" House	— —@16 00
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel	18 00@20 00

Per ton 2,000 lbs. delivered.

Freights.—April, 1871.

TO EASTERN PORTS.	From Philadel'a.	From E. Port and Port Johnston.	From Newburg.	From Rondout.
Amesbury	$2 50	$2 00		
Bangor	2 30	1 60		
Bath	2 30	1 75		
Boston	2 .0	1 85		
Bridgeport	1 75	1 00		
Bristol	2 00	1 40		
Cambridgeport	2 75	2 00		
Derby	2 00	1 20		
Dighton	2 30	— —		
East Cambridge	2 35	2 00		
Fall River	2 50	1 40		
Hackensack	1 75	1 00		
Hartford	2 50	1 50		
Jersey City	1 .1	60		
Middletown	2 25	1 25		
Mystic	— —	1 25		
New Bedford	2 00	1 40		
Newburyport	2 65	1 85		
New Haven	1 90	1 00		
New London	1 76	1 25		
Newport	2 00	1 40		
New York	1 35	60		
Norwalk	1 80	1 00		
Norwich	2 00	1 30		
Pawtucket	2 30	1 50		
Portland	2 30	1 50		
Portsmouth, N. H.	1 45	1 85		
Providence	2 00	1 25		
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 20		
Salem	2 35	1 65		
Stamford	2 00	1 00		
Stonington	2 00	1 30		
Taunton	2 30	1 75		
Warren	—	1 40		
Washington	1 25			
TO RIVER PORTS.				
Albany				
Catskill				
Cocksackie				
Coeyman's				
Cold Spring				
Fishkill				
Haverstraw				
Hudson				
New York				
Nyack				
Poughkeepsie				
Rhinebeck				
Rondout				
Sangerties				
Sing Sing				
Stuyvesant				
Tarrytown				
Troy				
West Point				
Yonkers				

Foreign and Provincial Freights.

April, 1871.
Closed for the winter.

Foreign.
Newcastle and Ports on Tyne, per keel of 21 1-5 tons..... £14 00@£16 00
Liverpool, 5 per cent primage..... 13s @15 ton.

TO NEW YORK.

Provincial.
Sidney..... $ —
Lingan..... —
Cow Bay..... —
Port Caledonia..... —
Little Glace Bay..... —

TO BOSTON.

Sydney..... $ —
Lingan..... —
Cow Bay..... —
Port Caledonia..... —
Little Glace Bay..... —

Rates of Transportation to Tide Water.

Closed for the Season.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon..... $4 00
Less drawback of 50 cents on all Coal shipped east of New Brunswick and south of Cape Henry.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton..... $1 84
C. R. R., N. J., Easton to Elizabethport..... 2 63
Shipping expenses at Elizabethport..... 25
Warfage..... 10
Total..... $4 83

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton... $1 84
C R R., of N. J., Easton to Pt. Johnson 2 72
Shipping expenses..... 25
Warfage..... 10
Total..... $4 91

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton ..... $ —
Morris & Essex R. R. Easton to Hoboken..... —
Shipping expenses..... —
Warfage..... —
Total..... $ —

TO SOUTH AMBOY.

L. V. R. R. & B. & D. R. R. } ..... —
Cam. & Am. R. R. }
Shipping Expenses, ... —
Total ..... $ —

PENN HAVEN TO ELIZABETHPORT.

L. V. RR Penn Haven to Easton ..... —
C. RR. of N. J. Easton to Elizabethport..... —
Shipping expenses ..... —
Wharfage..... —
Total..... $ —

METALS.

NEW YORK, April 20, 1871.

IRON.—Duty: Bars, 1 to 1¼ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1¼ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1½ to 1¾ cents ₱ lb; Pig, 7 ₱ ton; Polished Sheet, 3cents ₱ lb; Galvanized 2½; Scrap Cast, $6; Wrought, 8 per ton.

	Store Prices.
Pig, Scotch No. 1, ₱ ton	33 00@36 00
Pig, American, No. 1	34 00@36 00
Pig, American, No. 2	32 00@34 00
Pig, American, Forge	31 00@32 00
Bar Refined, English and American	— —@75 00
Bar Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash.
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	110 00@115 00
Bar, Refined " "	77 50@— —
Bar, Common " "	85 00@— —
Scroll " "	— —@— —
Ovals and half-round " "	100 00@120 —
Band " "	95 00@105 00
Horse Shoe " "	92 50@ 95 —
Rods, ⅝ to 3-16 inch " "	82 50@120 —
Hoop " "	100 00@140 00
Nail rod	— —@6¾ —
Sheet, Russia, as to Nos. (gold)	10¼@—11
Sheet, Single, D. and T. Common	—4½@— 6
Sheet, Galv'd, Nos. 14 to 26 9 and 12o. Nos. 27, 28, and 29, 12@14	
Rails, English (gold), ₱ ton	55 00 @57 00
Rails, American, at Works in Pa.	70 00 @72 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 3½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb		— 15	@— 18
English Spring (2d and 1st quality)		— 7	@— 10
English Blister (2d and 1st quality)		— 10	@— 17
English Machinery		— 11½	@— 14
English German (2d and 1st quality)		— 13	@— 15
American Blister "Black Diamond"		— —	@— 13
American, Cast, Tool	do.	— 16	@— 17
American, Spring,	do.	— 9	@— 11
American Machinery,	do.	— —	@— 12
American German,	do.	— 9	@— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	36 @— 38
Copper, Old Sheathing, &c. clean	19 @— 20
Copper, Chili Pig	— @— —
Copper, American Ingot	21¾@— 21¾
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	— @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb: Pipe and Sheet, 2½ cents ₱ lb.

Galena, ₱ 100 lbs	$— —@— —
Spanish (gold)	5 15 @6 18
German, do.	6 15 @6 18
English, do.	6 20 @6 50
Bar (net)	— —@8 75
Pipe (net)	— —@10 25
Sheet	— —@10 25
Colwell, Shaw & Willard Tin-Lined Pipe 15 cts. ₱ lb.	

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent.; Roofing 25. ad val.

	Gold ₱ lb.
Banca	@—38½
Straits	32¾@33
English	—@32¾

PLATES.

	Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ₱ box	$8 37½	@8 75	$9 62½@10 00
I. C. Coke	7 25	@7 75	8 25 @8 75
Coke Terne	6 12½	@7 12½	7 00 @8 25
Charcoal Terne	7 50	@8 12½	8 62½@9 25

REMARKS.

IRON.—The market for Scotch Pig remains without change, the light supply restricting business, and prices still have an upward tendency. The sales are 200 tons Glengarnock, in lots, at $33.50 @$34, and 400 do., to arrive, part $32.25. There has been an improved demand for American, and prices continue very firm—we notice sales of 1,000 tons No. 1 Lehigh, season delivery, at the market price at the time of delivery; 500 do. Nos. 1 and 2 Hudson, 400 do. Lehigh Crane, and 200 do. Poughkeepsie, on private terms. We quote No. 1, $34@36; and No. 2, $32@34. Wrought Scrap is in limited supply and good request at steady rates; 300 tons have been taken from yard at a private price. Rails have been in active request, and we notice sales of 100 tons 50 lb. Erie, $56.50, gold; 3,500 do. 56 lb., English, to arrive, 500 do., to arrive at New Orleans, and 500 do. Old T, to arrive here, on private terms. Refined Bar continues dull and nominally unchanged.

TIN.—There is no life in the market for Pig, and though cable quotations from London note more movement there, with an advance in price (Straits now £133), there is no response here. The sales are 250 slabs Straits at 32½@33 cents, and 10 tons English 32½@32⅝, gold. Plates have also improved in England, but prices here are without quotable change, though there has been a larger business. Charcoal Terne are very scarce, and best brands are held at $8.12½, gold; sales have been made of 1,200 boxes assorted Charcoal Tin at $8.25@$8.50 for I. C.; 200 do. 14 by 20, I. C. Coke, $7.62½; 100 do. 12 by 12, do., $7.37½; 1,400 do. Charcoal Terne, $7.50@$7.75; 200 do. 20 by 28, do., $16.25, all gold; and 1,500 do. Charcoal Tin, on private terms.

COPPER.—The manufactures of Copper and Yellow Metal are steady at our quoted rates. The large business in ingot noted in our last has concentrated the stock here and to arrive, and the market is firm, but not quotably higher. Manufacturers are buying more freely, however, and there is a better tone than before. The sales embrace about 1,000,000 lbs. Lake at 21⅛@21¼ cents, for lots on the spot, and 21½ for June, July and August delivery.

LEAD.—The market for Pig is not so firm, under reports that the Government contemplates reducing their price 5 cents per 100 lbs.; 100 tons ordinary Foreign sold at $6.15, gold, and 100 do. soft Spanish and 25 do. Scrap, on private terms. Bar 8¾ cents, and Pipe and Sheet 10½, cash, less 10 per cent. to the Trade—Tin-lined Pipe 15, less 2 cents to the Trade.

ZINC.—Spelter, Foreign, 6c., gold; Spelter, American, (Missouri), 7@11c., currency; Sheet Zinc, all sizes, 9c., gold; Zinc Paint, Foreign (dry), 10c.; Zinc Paint, American, 17c.; Manganese, high grade, 4½c.

San Francisco Stock Market.

A telegram from San Francisco April 13, quotes mining stocks as follows:—

Savage	62
Yellow Jacket	67¼
Kentuck	74
Chollar Potosi	74
Gould & Curry	59
Belcher	54
Imperial	35
Ama or	—
Crown Point	169
Hale & Norcross	—

The Slate Trade.

NEW YORK, April 21, 1871.

From our correspondent at Granville, we have the first return of shipments for the season. During the winter the trade in the Vermont region has been very dull, shipments being so small as to be not worth publishing. The opening of the business, however, gives promise of a good trade this season.

An item in one of the dailies this morning reports the destruction of the West Castleton Slate Company's mills and buildings by fire, on Saturday last. The loss is stated at $150,000—$54,000 insurance. This will be a severely-felt loss, as the company have usually employed a large number of hands—the most of whom, we presume, will be be left without work.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$6 50@ 7 00
" green, 1st " "	6 50@ 7 00
" red, 1st " "	15 00@16 00
" variegated, " "	5 75@ 6 20
d. b'k and d'k blue, 1st qual., "	6 00@ 7 05

PRICES OF ROOFING SLATE LOADED ON THE CARS AT POULTNEY.

	per square	
Red,	$7 00	@ $11 00
Purple, " "	4 50	@ 5 00
Best q'l. Unf'g. Gr'n. " "	4 50	@ 5 00
Gr'n or Vargtd. " "	3 25	@ 4 25

VERMONT SLATE TRADE.

REPORT of Slate Shipped from Middle Granville, N.Y., via the R. & S. R. R., for the week ending April 15, and for the year 1871.

ROOFING SLATE.

NO. OF SQUARES.	Week.	Prev'ly.	Year.
Penrhyn Slate Co	620	95	715
New York Slate Co	60	....	60
Middle Granville Slate Co	285	....	285
American Slate Co	....	....	....
Benj. Williams	215	135	350
Jones & Williams	....	....	....
Eagle Slate Co	60	....	60
Mettowee Slate Co	75	70	145
Albany Slate Co	55	....	55
H. W. Hughes	30	....	30
Total	....	....	—

MILL STOCK, MANTLES, &C.

NO. OF CASES SHIPPED BY	Week.	Prev'ly.	Total.
Eagle Slate Co	cars ..	..	..
Penrhyn Slate Co	" 735	418	1,153

BLACK BOARDS.

NO. OF CASES.	Week.	Prev'ly.	Total.
Eagle Slate Co	....	....	....
Penrhyn Slate Co	....	....	....

MILL STOCK, &C.

NO. OF CARS SHIPPED BY,	WEEK.	PREVIOUSLY.	YEAR.
Eagle Slate Co	4	2	6
Penrhyn Slate Co	....	....	....

MISCELLANEOUS.

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The Production of Alloys of Iron and Manganese, and their Application to the Manufacture of Steel.

THE following is an abstract of the paper by Mr. FERDINAND KÖHN, C. E., on the above subject, read before the English Iron and Steel Institute:

This paper was prepared for the Merthyr meeting of the Institute last autumn, but time did not admit of its being discussed.

The author stated that the properties of alloys of iron and manganese have not, as yet, been completely investigated, and much difference of opinion exists with regard to the theoretical position of manganese in the process of steel manufacture, though absolute unanimity prevails amongst steel makers as to the practical necessity of employing manganese in the manufacture of cast steel. Special allusion is made to the well-known spiegeleisen, from the district of Liegen, in Rhenish Prussia, which contains from 7 to 11 per cent. of manganese. A kind of pig iron is there made from a spathic iron ore, which is a crystallized compound of carbonate of manganese and carbonate of iron. The production of spiegeleisen requires a particular management of the furnace, but with recent improvements, the ironmasters of Liegen have learnt to make this substance with hot-blast and coke, utilization of waste gases, and a high temperature in the zone of fusion. With the best-managed blast furnaces, intended specially for manufacturing spiegeleisen, only from 70 to 80 per cent. of the total annual produce is iron of that class. The quantity of combined carbon in spiegeleisen is about 5 per cent. In adding a dose of spiegel to a charge of de-carburized iron, it is unavoidable that a proportionate quantity of carbon must be put in for any given amount of manganese which it is desired to introduce into the charge, and this leads to a difficulty in manufacturing very soft kinds of steel, which has always been very seriously felt by all Bessemer steel makers, and which has been overcome only to a certain extent by great experience in the management of the converter. The actual necessity for making very soft steel with Liegen spiegeleisen is to "overblow" the charge to such an extent that there is oxygen enough left in the metal to combine not only with all the manganese and silicon, but also with the greater part of the carbon introduced by the spiegeleisen. This practice has made it possible to apply ordinary spiegel to the manufacture of the softest kind of Bessemer steel, but it is an acknowledged makeshift, and the demand for the richer alloys of iron and manganese has for a long time past been felt by every steel maker in this country. The author particularly described the process for the manufacture of ferro-manganese, that has been invented and patented by Mr. HENDERSON, of Glasgow. With proper selection of materials, the average proportion of the alloy obtained by the process is from 20 to 30 per cent. of manganese. This can be manufactured at little more than £7 per ton, exclusive of royalties. Mr. KÖHN considers that the making of these artificial alloys of iron and manganese will be a suitable and remunerative industry, and will form a useful accessory to every Bessemer steel works in the country. Since the paper was written for the Merthyr meeting, the prices of natural and artificial alloys of iron and manganese in the markets of this country have undergone some rapid and considerable changes, which serve as further practical illustrations of the disadvantages previously pointed out, viz., the precarious position in which the steel manufacturers of this kingdom are placed, by relying exclusively upon one small district on the continent for the supply of these alloys, which they at present consider indispensable for the successful manufacture of iron and steel. On the other hand, some additional data have been obtained with regard to the influence of the rich ferro-manganese upon the qualities of the steel produced by their employment. The Terre Noire Company have continued to manufacture, and have employed ferro-manganese, made by Mr. HENDERSON'S process, with an average of 23 to 25 per cent. of metallic manganese in its composition. This alloy is used exclusively for the manufacture of the softest kind of Bessemer steel, which is required for boiler and ship plates, in the construction of ordnance, and for other similar purposes. The steel of Terre Noire is made from pig iron, which is run directly from the blast furnace into converters, without mixing with other kinds of iron. By the addition of the rich ferro-manganese, instead of the ordinary spiegeleisen, the Company have succeeded in manufacturing a special class of steel, which in ductility and capability of elongation is superior to all that is now known in the markets of this country. The Company have submitted some examples of their steel plates to Sir WILLIAM FAIRBAIRN for testing, and the results of his experiments are appended to the paper, together with some remarks with regard to the specimens. Sir WILLIAM says, that the steel submitted for examination consisted of six samples, and, taking them altogether, they exhibited considerable uniformity of character as regards ductility and strength. The highest as regards tenacity is below the average resistance of steel, but this is largely compensated for by its powers of elongation and ductility, and there is nothing comparable to it in any of the various manufactures with which he is acquainted. In its powers of resistance to a tensile strain, it stands against the Barrow steel as 27·1 to 32·2, but in ductility it stands in the ratio of ·219 per unit of length to ·092 of the Bessemer steel manufactured at Barrow from the hematite ores. These are important features in the character of this description of manufacture, which is admirably calculated for being drawn into the finest kind of wire.

Mr. SNELLUS said that he was glad to find that Mr. KÖHN had started the analysis of iron, because there were several bodies which accompanied pure iron, which exercised great influence on the tensile strength, and it was only by considering the whole of these that any clear conclusion would be arrived at. It was to be regretted, however, that he had not completed the analysis for sulphur and phosphorus, because these two bodies play as important—perhaps a more important—part than manganese. The old opinion, that manganese served only to remove the surplus oxygen, was not correct, for he had frequently found steels containing as much as 2-10ths per cent. of manganese, and with quite sufficient carbon to cause them to be classed as middling hard steels, which failed to roll well; while, on the other hand, he had had other steel which would have been classed as very hard steel, but which, when tested for tensile strain and for strength generally, turned out to be rather soft than otherwise. He, therefore, held the opinion that manganese not only seemed to remove the oxygen from the molten metal, but also to increase the tensile strength, and, to some extent, the softness of the metal. The quantity of manganese, however, did not account for extreme ductility, unless the metal was free from carbon and phosphorus. On several occasions, he had found more than six-tenths of manganese, and yet the steel was remarkably soft. He, therefore, did not think that manganese hardened the steel to any great extent, but rather that it had the opposite effect.

Mr. WILLIAMS asked Mr. KÖHN how the running of the iron direct from the blast furnace into the Bessemer converters was managed. There would be no doubt that if the thing was possible, it would effect a very great economy, but there were many difficulties in the way. One difficulty was, that there was sure to be a great amount of irregularity in the quality of the iron produced. He did not understand how the Bessemer converters could be placed so that the iron could be run direct into them, though, no doubt, it would be possible to arrange a system of travelling ladles to take the iron from the furnace to the vessel.

Mr. KÖHN said it was not run direct from the furnace at Terre Noire, but into a ladle first.

Mr. BAKER said he had analyzed Bessemer metal, and was satisfied manganese was not necessary to the quality of the metal, however useful it might be to produce it. Manganese might give an iron that might be soft, but some other element added, such as carbon, might cause brittleness.

Further discussion on the subject was held by Messrs. BELL, KÖHN, SNELLUS, and the Chairman. Mr. SNELLUS said that his idea was that manganese served a double purpose, not only to remove oxygen, but to form an alloy with the iron.

Mr. BESSEMER said that when pure manganese, free from iron, was added in excess to entirely decarbonized iron, the product so closely resembled copper in its properties, that it seemed removed from ordinary iron. He had collected the gases given off from steel in the process of solidification, and they were pronounced by an able chemist to consist of carbonic oxide.

The Sherman (Atwood) Steel Process.

THE following discussion by some of the leading iron manufacturers of Great Britain, recently took place at a scientific meeting in London.

Mr. WILLIAMS asked permission to bring before the meeting the subject of SHERMAN'S patent, as it had been alluded to in the President's opening address. He wished to know if any member of the Institute could tell him what had been the result of the experiments which had been made.

Mr. MENELAUS said, some months ago he was asked by a friend in London to send him a report of Mr. SHERMAN'S process, and he thereupon tried to obtain some information regarding it, but was told that it was intended to keep it a secret. However, he sent Mr. SNELLUS to Sheffield, where the experiments were being conducted, with instructions to watch the operations, and bring back samples of the results. Mr. SNELLUS went, and saw a series of fair and reliable experiments. Material was put into the pots, some of which were physicked, and others treated in the ordinary way, and Mr. SNELLUS brought back samples, and made an elaborate analysis of them, and the result was that there was no appreciable difference between the steel treated by the SHERMAN process and that dealt with in the ordinary way. He (Mr. MENELAUS) thereupon wrote to his friend in London, stating that, as far as his knowledge went, there was nothing in the invention. Upon hearing of this, Mr. SHERMAN said he did not care about the chemical results, but he would satisfactorily prove that mechanically there was a very great improvement in the steel which had been subjected to his process. Mr. SNELLUS was afterwards sent to Chatham, where experiments were being made by the Government officials upon other samples of the steel, and the results entirely confirmed the chemical analysis. Mr. SHERMAN some time after went to Dowlais, and he (Mr. MENELAUS) advised him to get a patent, and take it into the open market. Some further experiments were made in the puddling and in the smiths' shop, with precisely the same results. He did not believe that the small quantity of material that Mr. SHERMAN uses could possibly have the chemical effect which was claimed for it, and he had come to the conclusion that, in its present stage, the invention was of very little value.

Mr. HOPKINS said he was sorry to have to speak in disparagement of any inventor, but so far as his experience went he was obliged to endorse what Mr. MENELAUS had said. Mr. SHERMAN had visited the Cleveland district, and a great number of the iron masters of the district met him. He selected four furnaces, and pretended that his process would produce a fibrous puddle bar and a fibrous rolled bar afterwards, no matter what description of pig iron was used. The result of the experiments, however, was that the bars that were expected to be brittle were brittle, while those that were expected to be tough were tough. Mr. SHERMAN himself was quite astonished at his want of success.

Mr. BELL said he could not conceive that material which could be placed on a five shilling piece when laid on five hundred weight of iron would produce any great effect. There are sixty-three simple substances, and he defied Mr. SHERMAN to put his finger upon any one of those simple substances, or any of the secondary or terniary compounds which could by any chance produce the results he promised to effect. He said: "That may be very true, but possibly the beneficial effect upon the iron is owing to a greater heat being produced in the puddling furnace." This, however, was highly improbable. The Institute was a kind of filter, through which every idea proposed by the world for the acceptance of the iron trade should be made to pass, and he therefore thought Mr. WILLIAMS had done right in bringing the matter before them. The President, in his address, had carefully abstained from pronouncing any opinion one way or another, but a certain amount of *prestige* attached to the mention of any project by the President of the Institute, and it was, therefore, necessary to deal with such matters according to their worth. It was really a kindness to the inventors themselves, if there really was nothing in their inventions, to tell them so.

Mr. SIEMENS said he had seen the steel produced by the SHERMAN process, and there was no appreciable diminution in the phosphorus and sulphur resulting from the admixture of the physic.

The CHAIRMAN said he felt indebted to Mr. WILLIAMS for affording an opportunity of making an explanation, which had evidently become necessary. The accounts which had reached him of the process had come from friends of Mr. SHERMAN, and consequently had a very bright glow about them. He had not heard one word about the trials which had just been alluded to, and therefore when he was told such and such results had been obtained, and that parties were going to take licenses, and make thousands and thousands of pure iron from the very worst material in the country, he did not feel in a position to ignore such apparent facts, although he could not understand how it was possible that such an effect could be produced.

The Bright Tints of Autumnal Foliage.

BY the combination of the microscope and spectroscope H. C. SORBY, F. R. S., has investigated the various coloring matters which impart to the autumn leaves their beautiful tints. In a recent communication to the *Chemical News* he says that the complete study of the subject would require much research, but by the careful examination of several dozen plants he has been enabled to separate and classify a number of different colors.

The optical rather than the chemical method has been adopted by the experimentist on account of its greater reliability. Chemical analysis, he thinks, would sometimes lead us to suppose that different substances were the same, and the same different, when we come to deal with such delicate compounds as these coloring matters. Thus he finds, for example, that *chlorophyl* which has been considered as a simple substance is resolved by optical examination into a number of separate species. Two or more of these form the green coloring matter of most leaves. All the different species of this group have a well-marked absorption band in the red. In another class the spectra show absorption at the blue end, in some cases, with well defined narrow bands. The absorption bands are best seen when the coloring matters are dissolved in bisulphide of carbon. By oxidation, the brilliant reds and yellows give almost exactly the same dark colored leaves, showing that the coloring matter is in this way so completely destroyed as to exert no influence upon the dark tints subsequently developed. The connection of the altered and unaltered products is rendered very difficult since some of them are without doubt produced by the decomposition of the most varied compounds.

The Production of the Prussian Mines.

DURING the year 1869 there were produced in Prussia twenty-three million tons of bituminous coal, valued at forty-five million thalers; six million tons of lignite, valued at five million thalers; two million tons of iron ore, worth six million thalers; a half a million tons of zinc ore, worth three million thalers; a hundred thousand tons of lead ore, worth five million thalers; two hundred thousand tons of copper ore, worth a million and a half thalers; seventy-four thousand dollars worth of silver ore; eighteen thousand tons of manganese ore, worth two hundred and thirty thousand dollars; seventy thousand tons of sulphur and vitriol ores, worth three hundred and twenty-two thousand thalers; and smaller quantities of quicksilver, nickel, cobalt, arsenic and antimony ores. Graphite, fluor-spar, alum-slate, barytes, phosphorite and roofing slate are also included in the list, the value of the annual production of all these being six hundred and fifty thousand thalers.

The total number of mines is three thousand two hundred and fifty-two, employing two hundred thousand men, and yielding annually a product worth sixty-eight million thalers.

Ice Machines.

THE most recent invention in this line and at the same time the simplest, has been made in San Francisco. The process consists simply in extracting the air from the water to be frozen, and in this way the inventor claims that he can produce solid transparent ice. The expansion of compressed air in ice machines is not by any means a new idea, but we believe that nobody ever thought that they could freeze water by exhausting the air contained in it. The experiment of exhausting the air from water, and thus apparently causing the water to boil, is a favorite one with all classes of lecturers on physics, from the college professor to the school teacher, and it seems somewhat strange that none of them, either lecturers or hearers, ever noticed that the water was frozen during the process. We shall probably hear that the result reached in California is due to the remarkable purity of the water.

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., WILLARD P. WARD, M. E., } Editors.

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The Manufacture of Iron.

WE invite the attention of our readers, especially those who are interested in the production or subsequent working of iron, to the address of Mr. HENRY BESSEMER, the inventor of the process which bears his name, delivered upon the occasion of his assuming the position of President of the Iron and Steel Institute of Great Britain. This gentleman's extensive practical experience, his world-wide reputation, and his well known enterprise and liberality add weight to his remarks, which ought to entitle them to the candid consideration of American iron masters.

There was a time both in England and in this country when iron furnaces were worked upon what has been aptly termed "the put in at the top and take out at the bottom principle." Iron masters were themselves ignorant of science and despised it in others. Now, however, our intelligent manufacturers in the centres of iron production have found it to their advantage to make use of the results of the scientific researches made by others, and in some instances the managers of our largest furnaces are themselves men of scientific acquirements. Among our smaller furnace managers but few possess sufficient knowledge to make the best use of the materials at hand. This question depends upon the chemical and physical character of the ores, the proportions in which they are mixed, and the character of the coal and limestone employed, as well as upon the height and proportions of the furnace and the capacity of the blowing machinery, and hence would probably have a different solution for each individual furnace throughout the country, and require for its solution in each instance both theoretical and practical knowledge and patient and laborious investigation. Every one who has had any experience with a blast furnace is aware that practical experiments in iron smelting are expensive affairs, and that innovations and alterations made by those not thoroughly acquainted with the chemical changes and combinations which take place in the furnace, rarely result in anything but failure and a quick return to the old system of working. Hence arises the conservatism and aversion to changes which characterize iron masters generally, and which are especially striking in our own countrymen, who in other affairs make so many changes and who are so eager to try all new inventions and improvements.

Let an ordinary furnaceman come into a new iron field, where the ore, the coal and the limestone are different from those to which he has been accustomed, and without any knowledge of their chemical constituents, he will at once, if called upon to build and run a furnace, adopt precisely the same furnace and the same system of working to which he has been accustomed. Perhaps if the ore looks a little more or a little less dense than ordinary, and the individual is especially enterprising, he would venture to make a slight change from his old plan, perhaps in the proportion of coal. But our iron manufacturers have discovered that this manner of proceeding does not yield good practical results, and from this cause has, we presume, arisen among ironmasters a disregard for metallurgical skill and knowledge not acquired in their own district, at all events not gained by working the same kinds of ore and coal. Herein is, however, the difference between the value of the experience of a man who understands the principles and theory of iron smelting and the results which must arise from the combination of different chemical substances, and is capable of reasoning upon them, and that of a man without this knowledge. The experience of the one will be of great value to him under the new conditions, that of the other almost worthless, so far as the planning of the new furnace and mode of working is concerned.

In like manner an educated ironmaster may gain many valuable hints from the papers recently read before the Iron and Steel Institute, and the discussion upon them by the most scientific and the best practical iron smelters in England, several of which appear this week in our columns, whereas to those not capable of making their own deductions from them they would be of but little value. We are aware that many of our ironmasters think that but little of practical value in this country, can be gained from such sources, but we think that the opinion of learned and experienced men such as BELL, SIEMENS, MENELAUS, WILLIAMS, and BESSEMER, upon such subjects as the Sherman process, and upon the action of alloys of iron and manganese are well worth the time which it will take to read them. Other articles, such as those upon the height of furnaces and the use of raw coal, which we reserve for another week, are also full of valuable hints.

Mr. BESSEMER's suggestion that theoretically there is no impossibility in making the very purest iron from the poorest materials, ought to encourage those making honest attempts at improvements and furnish food for reflection to all.

The Granite Song.

WE add herewith to the series of poetico-geological lyrics which we have from time to time laid before our readers, a hasty translation of the famous "*Granit-lied*" of VICTOR SCHEFFEL. It belongs to the same class as the song of the Ichthyosaurus and the Guano-song, the latter of which, in a translation from the hand of an accomplished correspondent, we published a few weeks ago. Indeed, it was the reception of that favor, recalling to mind a plan which we fondly entertained, in more youthful and leisurely days, which stimulated us to take up once more a somewhat rusty pen, and essay the reproduction of another gem from the land of poets and geologists.

It will scarcely be necessary to point out to the reader who is acquainted with the history of Germany during the last fifty years, the underlying political meaning in many of the whimsical student-songs of that country. The Guano-song is a satire upon the meditative, unpractical philosophers, whose labors bring forth but rubbish, while the active world goes busily on. The Song of the Ichthyosaurus wittly depicts the horror of an old fogy at the changes which are about to sweep from existence himself and his class. But in both of these we have rather the outburst of the *Burschengeist* against the "Philistine," than the definite expression of political theories. The Granite-song, however, is far more clearly a parable of revolution.

Since it is not so common in print as the others, we subjoin the German original, sacrificing our own reputation as translators to our desire that the reader familiar with that language may enjoy the many untranslatable touches of humor which we could not but fail to reproduce.

DER ALTE GRANIT.

In unterirdischer Kammer
Sprach grollend der alte Granit:
"Da droben den wässrigen Jammer,
Den mach' ich jetzt länger nicht mit.
Langweilig wälzt das Gewässer
Seine salzige Fluth über's Land;
Statt stolzer und schöner und besser
Wird alles voll Schlamm und voll Sand.

"Das gäb' eine mitleidswerthe
Geologische Leimsiederei,
Wenn die ganze Kruste der Erde
Nur ein sedimentäres Gebräu;
Am End' wird noch Fabel und Dichtung
Was ein Berg—was hoch, und was tief—
Zum Teufel die Flötzung und Schichtung;
Hurrah! Ich werd' eruptiv!"

Er sprach's, und zum Beistand rief er
Die tapfern Porphyre herbei;
Die krystallinischen Schiefer
Riss er höhnisch mitten entzwei.
Das zischte und lohte und wallte
Als nahe das Ende der Welt;
Selbst Grauwacke,' die züchtige Alte
Hat vor Schreck auf den Kopf sich gestellt.

Auch Steinkohl' und Zechstein und Trias
Entwichen, im innern gesprengt;
Laut jammert im Jura der Lias
Dass die Gluth ihn von hin'en versengt;
Auch die Kalke, die Mergel, die Kreiden,
Sprachen später mit wichtigem Ton,
"Was erstickte man nicht schon bei Zeiten
Den Keim dieser Revolution?"

Doch vorwärts, trotz Schichten und Seeen
Drang siegreich der feurige Held,
Bis dass er von sonnigen Höhen
Zu Füssen sich schaute die Welt.
Da sprach er mit Jodeln and Singen
"Hurrah! das wäre geglückt;
Auch unsereins kann's zu was bringen,
Wenn er nur herzhaftiglich drückt!"

We make no apology for the imperfections of the following translation. It is itself little else than an apology:

THE SONG OF THE GRANITE.

Old Granite growled with anger
In his subterranean bed,
"I'll not endure any longer
This watery nuisance o'erhead;
The tide, that forever is spilling
Its nasty brine on the land,
And, instead of beauty, filling
The earth with mud and sand!

"'Twould be a pretty kettle
Of geological fish,
If the whole world's crust should settle
To a mere sedimentary dish;
If a mountain were imagination,
And the surface had never a lump;
The devil take stratification!
I'm *eruptive*—Hurrah, I'LL ERUMP!"

He speaks, and calling after
The porphyries brave, to assist,
He tears with scornful laughter
The metamorphic schist;
It surges and blazes and hisses
Enough to wake the dead;
For fright, even modest old Mrs.
GRAYWACKE stands on her head!

The Permian, the Coal and the Trias
Gave way, their hearts breaking with fear,
And loud in the Jura the Lias
Cried out, being singed in the rear;
Then the marl, chalk and limestone cretaceous
Said wisely, "Somebody should
Have suppressed this uprising audacious,
By nipping it in the bud!"

But onward through all resistance
He rushes in hero-heat,
Till his head in the sunshine glistens
And the world lies at his feet!
"Hurrah! I always knew it;"
He shouts from the top of the hill,
"Even we granites can do it,
If we only push with a will!"

R. W. R.

Testing of Metals and Alloys.

A NEW method for testing metals and alloys for their purity was proposed by Professor BISCHOF, at the Liverpool meeting of the British Association. The principle underlying these tests is that impurities which lessen the commercial value of zinc, tin, brass, etc., at the same time lessen the tenacity of the metals. The test consists in bending backward and forward rolled pieces of the same size and weight. Chemically pure, best commercial and poorest commercial zinc, for example, stood according to this test respectively 100:54:19 bendings. Thus, for example, if a piece of rolled zinc of the standard size sustains thirty bendings, we know that it ranks between the best and poorest commercial qualities.

The difference between this method of testing and the ordinary chemical analysis, is that the former shows only the injury done to the metal by the foreign substance without specifying its name or the quantity contained in the metal under test; but the latter gives both the kind and amount of the adulteration without giving the injurious effect. With reference to the exactness of the new method, it is stated that the injurious effect of 0.00001 per cent. of tin or 0.0004 per cent. of cadmium can be detected in less than an hour, whereas by analysis such traces may escape the notice of a careful chemist. It is also often impossible for a merchant to await the result of a long chemical analysis.

The Calcasieu Sulphur Mining Company.

THE artesian well put down by this company was sunk under the immediate eye and supervision of Mons. A. GRANET, of Paris, an engineer of European reputation, and the inventor of an improved apparatus for extracting sulphur from the substances with which it is found combined in nature. Mons. GRANET is also a geologist of some repute, and has furnished the company with a report of the work, an extract from which was published in the New Orleans *Picayune* of March 26, 1871. The extract is as follows:

Towards the end of October last the Calcasieu Sulphur and Mining Company undertook to drill an artesian well, in order to ascertain the location, the bearings and the true richness of a layer of sulphur, accidently discovered scarcely two years ago whilst boring for a petroleum deposit. The first boring had just gone through a petroleum deposit containing too little oil to be worked profitably. It was therefore being continued, in the hope of finding, at a greater depth, a larger quantity of petroleum, when at the depth of four hundred and forty-three feet below the surface a layer of sulphur one hundred and eight feet in thickness was reached. Unfortunately, the parties who were in charge of the boring operations, being unacquainted with the full value of the precious metalloid which offered itself to them, went through it entirely without paying much attention to the discovery they had just made, and contenting themselves with designating rather loosely the layer they had found as "pure crystalline sulphur." They continued to bore still deeper in search of the petroleum deposit they hoped to find lower down, when, in fact, they had long since gone through it. The sulphur layer was discovered, its thickness was approximately ascertained, but its real richness was completely unknown. For this reason the Calcasieu Sulphur and Mining Company, established principally for the purpose of extracting the sulphur discovered, resolved, before undertaking to sink a large extracting well, to explore the entire layer by means of a new boring, and to ascertain the exact value in sulphur of the mineral constituting the sulphur bed. Such is a brief account of the motive which induced the renewed labors of which we propose now to make known the results. A vertical well, most carefully drilled by Mr. MUNN, who has been long familiar with that special work, struck the sulphur bed at a depth of 428 feet, and went through its entire thickness of 112 feet. It would take up too much space, and, besides, it would be entirely useless to give here the geological description of the various layers that were encountered before we touched the sulphur bed; I shall, therefore, confine myself to a description of the latter, the only one which it is really important to study. The sulphur appears in compact and

amorphous masses, of a pale color, interspersed here and there with yellow crystals. It is surrounded by a calcareous crystalline matrix, of a whitish color and rather considerable hardness, but which, nevertheless, is easily reduced to powder under the stroke of the hammer. It is clear, therefore, that the working of the drilling tool through this bed must for that very reason have been long and difficult; and that the fragments brought up from the well after each stroke must have come up in the shape of a powder more or less fine, according to the relative hardness of the various parts of the sulphur bed. The debris extracted from the well, after each stroke, has given clear and precise evidence that the entire bed, from the summit to the base, is of extraordinary richness, and also that it is easy to extract it.

As regards the shaft to be sunk in order to reach the sulphur, there is no serious difficulty to be encountered. The bed or layer commences at the depth of 428 feet, and terminates at 540; it has hence a thickness of 112 feet. The proportion of sulphur at the summit is 60 per cent. This proportion increases rapidly as we descend deeper into the interior of the bed. At 441 feet, it becomes 70 per cent.; at 459 it is 80 per cent.; at 466 feet 83 per cent.; finally at 486 it rises to 90 per cent. From that depth the quantity of sulphur falls off gradually from 90 to 80 per cent., then to 75 per cent., then rises again to 80, and finally comes down to 68 per cent. at the depth of 540 feet, which point must be considered as the lower limit of the bed. From 540 to 552 feet, where the drilling stopped, the calcareous matrix changes color, becomes grayish, and still contains a certain quantity of sulphur, in the proportion of 30 to 40 per cent. Finally, at the depth of 552 feet, the sulphur tends to disappear. This is a complete description of the sulphur bed we have explored. From the moment the drilling instrument first struck the sulphur, we took the minutest precautions to gather as far as possible every element disintegrated from the bed by the action of the tool. Whenever we had drilled to the depth of two or three feet, the drilling instrument was withdrawn, and the special tool destined to bring up to the surface the crushed substances was sunk in its place. The matter extracted every six feet in depth was thrown together, thoroughly mixed and analyzed on the same day. It is thus that we have procured the eighteen specimens, which every one can examine in the office of the company, No. 18 Carondelet street. The general analysis of the sulphur thus gathered, made by Mr. GRIFFO, pharmaceutist, on a thorough mixture of two ounces of mineral taken from each one of the eighteen vials constituting the entire series of specimens exbibited, yielded 77 per cent. of sulphur—that is, nearly 28 ounces of remarkably pure sulphur. Such results need no comment; they strike the mind at once and are self-demonstrated. To insist upon them would merely weaken their full import. Much has been said respecting the difficulties to be encountered in sinking a shaft through the various strata which overlay the sulphur bed.

I cannot expatiate in this report upon the technical details of the various processes of sinking such a shaft through the crumbling or aquiferous strata to be encountered; this is the special province of the mining engineer who superintends the works. I will simply say that the sinking of the shaft, although difficult to execute, will present, nevertheless, in its construction no problem which a special engineer cannot solve—no obstacle which cannot be overcome. As for the working of the sulphur bed itself it will not present the slightest difficulty, for the rock, without being too hard to disintegrate, is yet sufficiently compact and resisting to sustain, without any wooden scaffolding or coating, all the galleries to be constructed.

In Sicily, pre-eminently a sulphur producing country, the art of working mines is yet in its infancy. The sulphur strata are met at average depths of 120 to 150 feet below the surface, and they are reached by means of very sloping galleries, supplied through their whole length with steps dug in the soil itself. All the mineral extracted by the miners is brought up to light by children from 12 to 16 years. They take upon their shoulders one or two stones, which they bring up with much trouble to the surface, after overcoming untold obstacles in ascending those steps, always roughly made and partly crumbling. Having reached daylight they lay down their load, and at once descend again to the bottom of the mine to repeat the same operation.

The mode of manipulating the mineral is still worse; it is barbarous, I may even say absurd. The proportion of sulphur in the mineral is from twenty to thirty per cent., or an average of twenty-five per cent. Of this twenty-five per cent. the Sicilians scarcely extract from ten to fourteen per cent. of sulphur, for owing to the lack of fuel they are compelled to use the sulphur itselfto accomplish the melting; in other words, to burn one-half in order to melt the other half, obtaining thereby a very impure product, which has to be manipulated again and refined before being delivered for consumption. The means of transportation of sulphur in the interior of Sicily are also very costly; it has to be carried first by mules from the mine to the road, where it is taken up in small carts to the nearest port, often more than forty miles distant from the point of departure. In spite of all these drawbacks, the proprietor of a sulphur mine in Sicily always realizes a fortune. I will say more. Certain companies, which have been established in the island a few years since, give as a royalty to the owner of the mines occupied by them twenty and often twenty-five per cent. of the sulphur gathered by them and manipulated into a marketable article. These companies, nevertheless, realize large profits.

What, then, will be the result in the case of a mine yielding 77 per cent. of sulphur of the best quality, worked by the most improved mechanical apparatus, and located in a region where the abundance and the cheapness of fuel will permit the extraction at a very small expense of the entire quantity of sulphur contained in the mineral? To sum up: The stratum of sulphur just discovered lies at a depth of 428 feet below the surface of the soil, and the shaft it will be necessary to sink in order to reach it through the various strata which overlay it can be constructed without any really serious difficulty. The mineral constituting the bed contains the average proportion of 77 per cent. of pure sulphur. As soon as the well is done, the extraction of the mineral will be easy, and its manipulation simple and cheap. Finally, the means of transportation are excellent, either by the Chattanooga Railroad, which will pass within half a mile of the mine, and to which an auxiliary branch could be made, or by the Calcasieu River, which is navigable and flows at a distance of five miles from the works. As regards the extraction of the mineral itself, it will be in the power of the mining engineer entrusted with the management of the works, to bring up, within reasonable limits, any quantity of mineral the company may desire.

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113,799.—BRICK-LIFTER.—K. Julius Rugg, Cincinnati, Ohio.
113,800.—PLANING-TOOL.—Nathaniel Russell, Plymouth, Mass.
113,801.—APPARATUS FOR CONVERTING ROTARY INTO RECIPROCATE MOTION BY MEANS OF FRICTION.—Richard Sammer, Vineland, N. J.
113,802.—HORSE-COLLAR.—John W. Schwaner, Egg Harbor City, N. J.
113,803.—SOLDERING-FURNACE.—Conrad Seimel, Green Point, assignor to himself and J. Hubert Richardson, Brooklyn, N. Y.
113,804.—DUMPING-CAR.—William A. Sharp, Tama City, Iowa.
113,805.—FERRULE.—Dolphin G. Smith, Columbus, Ohio.
113,806.—MILKING-STOOL.—George Smith, Rochester, N. Y.
113,807.—COOKING-STOVE.—Samuel Smith, Philadelphia, Pa., assignor to himself and Charles Noble & Co., same place.
113,808.—HOOK FOR BIRD-CAGES.—John M. Spring, New Britain, Conn., assignor to P. & F. Corbin, same place.
113,809.—CHEESE-HOOP.—William Sternberg, Bridgeport, N. Y.
113,810.—STEAM-ENGINE VALVE.—Nathan Page Stevens, Hopkinton, N. H.
113,811.—PETROLEUM-STILL.—John L. Stewart and John P. Logan, Philadelphia, Pa.
113,812.—CHAIR AND CRADLE COMBINED.—Edmund Stoneyerton, Canada.
113,813, antedated April 1, 1871.—HORSE HAY-RAKE.—Ole O. Storle, North Cape, Wis.
113,814.—SELF-ACTING MULE FOR SPINNING.—James Sutherland, East Hampton, Mass.
113,815.—DRILLING-MACHINE.—George C. Taft, Worcester, Mass.
113,816.—MACHINE FOR MAKING POTTERY-WARE.—Samuel R. Thompson, Portsmouth, N. H.
113,817.—POUND-NET FOR FISHING.—Patrick E. Tiernan, Waukegan, Ill.
113,818.—STEAM-ENGINE.—Samuel D. Tillman, New York, N. Y.
113,819.—CORN-PLANTER.—Granville J. Vaught, Hanly, Ky.
113,820.—DISINFECTING COMPOUND.—Guillaume Viqué, Aîné, Bordeaux, France.
113,821.—WARDROBE AND BOOK-CASE.—Ferdinand F. Voight, New Orleans, La.
113,822.—LIFTER FOR SPITTOONS, &c.—James Walker and Henry F. Lilly, Philadelphia, Pa.
113,823.—WATER-WHEEL.—John S. Warren, Fishkill-on-the-Hudson, N. Y.
113,824.—SHAPING-MACHINE.—William H. Warren, Worcester, Mass., assignor to Aurin Wood and Joseph F. Light, same place.
113,825.—COMB FOR COMBING-MACHINES.—Charles Weiler, Landenberg, Pa., assignor to Martin Landenberger & Co., same place.
113,826.—SELF-RELEASING CLUTCH FOR WATER-WHEELS.—Geo. W. Wesley, Meadville, Pa.
113,827.—CASE FOR RIBBONS, LACES, &c.—Samuel Whitaker, Macon, assignor to himself and Aaron Ruth, Decatur, Ill.
113,828.—TIME-INDICATOR FOR OFFICES.—Edwin A. Wood, Utica, N. Y.
113,829.—AUTOMATIC RELIEF-VALVE.—Albert F. Allen, Providence, R. I.
113,830.—PORTABLE ROLLER FOR MOVING HEAVY BODIES.—John R. Anderson, New York, N. Y.
113,831.—MACHINE FOR BALLING OAKUM.—Samuel George Archibald, Edinburg, North Britain.
113,832.—APPARATUS AND PROCESS FOR TREATING COFFEE.—John Ashcroft, Brooklyn, N. Y., assignor to Sarah Jane Ashcroft, same place.
113,833.—LAMP-BURNER.—Lewis J. Atwood, Waterbury, Conn., assignor to The Plume and Atwood Manufacturing Company, same place.
113,834.—CLASP-FASTENER FOR BAGS, &c.—Alfred Home Balch and Wolfred David Emelius Nelson, Montreal, Canada.
113,835.—TONGUE-AND-GROOVE JOINT.—Richard Barton, New York, N. Y.
113,836.—HOISTING-MACHINE.—James Bates, Baltimore, Md.
113,837.—HAY-ELEVATOR.—Thomas Vandolah Bayly, Jones' Station, Ind.
113,838.—WOODEN PAVEMENT.—George A. Beidler, Philadelphia, Pa.
113,839.—ROTARY ENGINE.—Henry Leonard Bennison, Greenwich, England.
113,840.—GRAIN-DRIER.—William Blakey, Brooklyn, N. Y.
113,841.—FRICTION-CLUTCH FOR BELT-PULLEYS.—James H. Blessing, Albany, N. Y., assignor to himself and Townsend & Jackson, same place.
113,842.—COOKING-STOVE.—Mary Ann Boughton, Bridgeport, Conn.
113,843.—LOW-WATER INDICATOR.—William A. Bradford, Cincinnati, Ohio.
113,844.—APPARATUS FOR MAKING EXTRACTS FROM VEGETABLE AND ANIMAL SUBSTANCES.—Louis Brauer, Philadelphia, Pa.
113,845.—BROOM.—Thomas E. C. Brinly, Louisville, Ky., assignor to Tyler, Brown & Co.
113,846.—COOKING-STOVE.—Dominicus Brix, Geneseo, Ill.
113,847, antedated April 8, 1871.—MACHINE FOR MAKING BRICKS AND TILES.—Isaac C. Bryant, Washington, D. C.
113,848.—HAY-TEDDER.—Hiram M. Burdick, Ilion, N. Y.
113,849.—HAY-TEDDER.—Hiram M. Burdick, Ilion, N. Y.
113,850.—MACHINERY FOR DRILLING ROCKS.—Charles Burleigh.

Fitchburg, Mass., assignor to "The Burleigh Rock-Drill Company," same place.

113,851.—CARRIAGE-WHEEL.—Garrett G. W. Burnham, Baltimore, Md., assignor to himself and James N. Burnham.

113,852.—CURTAIN-FIXTURE.—William Campbell, New York, N. Y.

113,853.—WATER-WHEEL AND CHUTE.—Elisha P. H. Capron, Hudson, N. Y.

113,854.—HOOP-SKIRT.—Albert Carter, New York, N. Y., assignor to Charles C. Carpenter, same place.

113,855.—CURCULIO-CATCHER.—Frank J. Claxton and Charles D. Stevens St. Louis, Mo.

113,856.—THIMBLE-SKEIN AND BOXING.—Moris Collins, Decatur, Ill.

113,857.—SECTIONAL STEAM-BOILER.—William H. Cornell, Easton, Pa.

113,858.—SPOOL-EXHIBITER.—John D. Cutter, Brooklyn, N. Y.

113,859.—PREPARING FLOUR FOR USE IN CONFECTIONERY, &c.—William G. Dean, Brooklyn, N. Y.

113,860.—LUBRICATOR FOR JOURNALS.—Patrick S. Devlan, Jersey City, N. J.

113,861.—CORPSE-PRESERVER.—Henry M. Diggins, Cincinnati, Ohio.

113,862.—DISH-RACK.—William H. Duffett, Rochester, N. Y.

113,863.—MACHINE FOR PIERCING LEATHER.—Asa Eggleston, Fall River, Mass.

113,864.—CONSTRUCTION OF THERMO-ELECTRIC PAIRS.—Moses G. Farmer, Salem, Mass.

113,865.—SAW-MILL.—William M. Ferry, Grand Haven, Mich.

113,866.—SAW-MILL.—William M. Ferry, Grand Haven, Mich.

113,867.—BEARING-STEP AND VERTICAL SHAFT.—Francis A. Gardner, Danbury, Conn.

113,868.—DEVICE FOR ADJUSTING MIRRORS.—Oliver L. Gardner and William Gardner, Glen Gardner, N. J.

113,869.—LIGHTNING-ROD.—Albert A. Gaylord, East Cleveland, Ohio.

113,870.—BEE-HIVE.—Daniel Gebhart, Sallimonia, assignor to himself and Peter Weimer, Saratoga, Ind.

113,871.—SLIDE FOR DRAWERS.—James S. Gibbons, Philadelphia, Pa.

113,872.—FENCE-POST.—Andrew J. Gill, Denver, Colorado Territory.

113,873.—TENON-MACHINE.—William Gilmore, Hudson, N. J., assignor to himself and Henry M. Rogers, same place.

113,874.—CARPET-FASTENER.—Antoine Givaudan, Washington; D. C.

113,875.—WATER-CLOSET VALVE.—William Gordon, Philadelphia, Pa., assignor to himself and Andrew McCambridge, same place.

113,876.—LAMP-BURNER.—William H. Gray, St. Louis, Mo.

113,877.—BURGLAR-PROOF SAFE.—Edward K. Hall, Louisville, Ky.

113,878.—RAILWAY-CAR TRUCK.—Francis S. Harrington, Boston, Mass.

113,879.—SPRING-ROLLER SHADE.—Stewart Hartshorn, New York, N. Y.

113,880.—CIGAR-MACHINE.—Issachar A. Heald, Lowell, Mass.

113,881.—ARCHED STRUCTURE.—Constantine Henderson, London, England, assignor to Edwin R. Hall, Philadelphia, Pa.

113,882.—METAL-CLAD SHINGLE.—Thomas N. Hickox, Brooklyn, N. Y.

113,883.—EXCAVATOR.—Marcus M. Hodgman, Weymouth, Mass.

113,884.—CARRIAGE-COUPLING.—Jacob Hollinger, Millersburg, Ohio.

113,885.—MACHINE FOR REDUCING OR POINTING WIRE.—Albert G. Hotchkiss, Wolcottville, Conn.

113,886.—BROILER.—William Thompson Howard, Baltimore, Md.

113,887.—HAND SEED-SOWER.—Thomas Howell, Morgantown, W. Va.

113,888.—WATER-WHEEL.—Chancy F. H. Huff, New York, N.Y.

113,889.—PEANUT-HULLER.—Josee Johnson, New York, N. Y.

113,890.—APPARATUS FOR CLEANING COFFEE, &c.—Josee Johnson, New York, N. Y.

13,891.—PIPE FOR WATER, GAS, &c.—Algernon K. Johnston, Brooklyn, N. Y.

113,892.—BEE-HIVE.—Campbell Jones and Albert Jones, Santa Anna, Ill.

113,893.—DINNER-PAIL.—Humphrys Joyce and Anthony Ernest, TROY, N. Y.

113,894.—STEAM-BATH.—Charles Kaestner, Chicago, Ill.

113,895.—DOUBLE-TREE.—David W. Kauffman, Sterling, Ill.

113,896.—WAGON-AXLE.—August Kessberger, Springfield, Ill.

113,897.—STEAM-PUMP.—Lucius J. Knowles, Worcester, Mass.

113,898.—MACHINE FOR MOLDING CHAIR-BACKS.—John Lemman, Cincinnati, Ohio.

113,899.—HORSE HAY-RAKE.—William H. Locke, Canton, Ill.

113,900.—COTTON AND HAY-PRESS.—Charles K. Marshall, New Orleans, La.

113,901, antedated April 10, 1871.—COTTON-PRESS AND TRAMPER.—Charles K. Marshall, New Orleans, La.

113,902.—BUCKLE.—John H. Martin, Columbus, Ohio.

113,903.—HEMMING AND TUCKING ATTACHMENT FOR SEWING-MACHINES.—William Nelson Martin, Boston, Mass.

113,904.—SHADE-CORD RETAINER.—William McConnell, Philadelphia, Pa.

113,905.—COMBINING CARBONACEOUS MATTER FOR THE MANUFACTURE OF GAS.—George McKenzie, Glasgow, Scotland.

113,906.—REVOLVING GAS-BURNER.—Frederick McLewee, New York, N. Y.

113,907.—SCROLL-SAW.—Louis Miller, Baltimore, Md.

113,908.—FIRE-GRATE.—George R. Moore, Philadelphia, Pa.

113,909.—REVERSIBLE KNOB-LATCH.—Wallace T. Munger, New Britain, Conn., assignor to P. & F. Corbin, same place.

113,910.—DOOR-LOCK.—Wallace T. Munger, New Britain, Conn., assignor to P. & F. Corbin, same place.

113,911.—APPARATUS FOR VAPOR-BATH.—George F. Munro, Sr., Albany, Mo.

113,912.—TYPE-SETTING AND DISTRIBUTING MACHINE.—Frank M. Neff and John E. Scruggs, Monroe, Iowa.

113,913, antedated April 8, 1871.—SHEAVE OR PULLEY-BLOCK.—Henry Nick, Paris, France.

113,914.—MACHINE FOR DRESSING MILL-STONES.—John Norman, Glasgow, Scotland, assignor to William H. Howland.

113,915.—BRACE FOR CARRIAGE SPRINGS.—Daniel W. Norris, Paxton, assignor to Michael Neill, Chatsworth, Ill.

113,916.—GATE FOR DRAW-BRIDGES.—Ferdinand Pairan, Dayton, Ohio, assignor to himself and Henry Myer, same place

113,917.—MACHINE FOR DRESSING WORSTED CORD.—Isaac E. Palmer, Hackensack, N. J.

113,918.—PRODUCT FOR MADDER.—Alfred Paraf, New York, N. Y., assignor to Edward Sabine Renwick, trustee, same place.

113,919.—COMPOSITION OF MADDER FOR PRINTING CLOTHS, &c.—Alfred Paraf, New York, N. Y., assignor to Edward Sabine Renwick, trustee, same place.

113,920.—WASH-BOILER.—Henry W. Pell, Rome, N. Y.

113,921.—EARTH-MATTRESS.—Theodore William Phinney, Newport, R. I.

113,922.—FORGING-MACHINE.—James Pipes, Ripley, W. Va.

113,923.—FOUNTAIN-BRUSH.—Zephire Poitras, Chicago, Ill., assignor to C. H. Merrill, F. G. Tanner, and A. W. Merrill, same place.

113,924.—SLEIGH-RUNNER ATTACHMENT TO WHEEL VEHICLES.—Zimri I. Pratt, Chicago, Ill.

113,925.—BEDSTEAD FASTENING.—Rezin M. Price, Leesville, Ohio.

113,926.—SAWING-MACHINE.—Paul Pryibil, New York, N. Y.

113,927.—MACHINE FOR CUTTING CLOTH, &c.—William Raeuchle, Philadelphia, Pa., assignor to himself, George Rex, and Abraham R. Bockius.

113,928.—BEE-HIVE.—Dwight Ripley Read, Lawrence, Kansas.

113,929.—WOOD PAVEMENT.—Philip H. Reinhard and Ernest F. M. Faehtz, Washington, D. C.

113,930.—SASH-HOLDER.—George W. Reisinger, Harrisburg, Pa.

113,931.—CAR-DOOR.—John H. Robertson, New York, N. Y.

113,932.—CAR-COUPLING.—W. Bolton Rogerson and Harvey Beyea, Paterson, N. J.

113,933.—WELDING-POWDER FOR IRON, &c.—Gervas Eby Rose, Philadelphia, Pa.

113,934.—HORSE HOE AND CULTIVATOR.—Guilford D. Rowell, Menomee Falls, Wis.

113,935.—SHOEMAKER'S JACK.—August Rust, Egg Harbor City, N. J.

113,936.—CORN-PLANTER.—William J. Sager, Milesburg, Pa.

113,937.—PERCUSSION-MATCH.—William Servant, Providence, R. I., assignor to himself and Josiah A. Whitman, same place.

113,938.—MEDICAL COMPOUND OR BITTERS.—William T. Sherwood, Ripon, Wis.

113,939.—BELT-SHIFTER.—William H. H. Sisum, Newark, N. J.

113,940.—REVERBERATING REED-CELL FOR ORGANS OR MELODEONS.—Charles W. Small, Worcester, Mass.

113,941.—HAT-VENTILATOR.—Alden Solmans, New York, N. Y.

113,942.—GAS-CONDENSER.—Ira N. Stanley, Brooklyn, N. Y.

113,943.—SAWING-MACHINE.—William Steschult, Glandorf, Ohio.

113,944.—SEAMING-MACHINE.—Orson W. Stow, Plantsville, Conn.

113,945.—HAME FOR HARNESS.—James Thornton and Emmit G. Latta, Wellsville, N. Y., assignors to James Thornton and James Ma ken, same place.

113,946.—SEAL FOR HYDRAULIC MAINS OF GAS-WORKS.—Samuel Trumbore, Easton, Pa.

113,947.—PRINTERS' INK.—Marshall Turley, Council Bluffs, Iowa.

113,948.—WASHING-MACHINE.—Foster Utley, Chapel Hill, N. C.

113,949.—LAUNDRY-STOVE.—John Vail, Cincinnati, Ohio.

113,950.—ROAD-SCRAPER.—Harvey B. Van Voorhis, Pittsburg, Pa.

113,951.—PROPELLING CANAL BOATS.—William W. Virdin, Baltimore, Md.

113,952.—COOKING-RANGE.—George W. Walker, Boston, Mass.

113,953.—TURN-TABLE.—George Walters, Phœnixville, Pa., assignor to Phœnix Iron Company, same place.

113,954.—BARREL-FILLER.—Lewis H. Watson, Pittsburg, Pa.

113,955.—STEAM-GENERATOR.—Elijah Weston, Buffalo, N. Y.

113,956.—STEAM-ENGINE VALVE.—Seth H. Whitmore, Decatur, Ill.

113,957.—NECK-TIE.—Joseph R. Wilber and Otis W. Peirce, Providence, R. I.

113,958.—FIRE-ESCAPE LADDER.—Tobias Witmer, Buffalo, N. Y.

113,959.—MACHINE FOR TURNING CRANK-PINS.—Milton G. Wood, Boston, Mass.

113,960.—PLOW.—Charles A. Beard and Ezra E. Evans, Zanesville, Ohio.

REISSUES.

4,342.—COMBINED VAPOR-BURNER AND LAMP-POST.—Benjamin D. Evans, Columbus, Ohio, assignor to John W. Baker.—Patent No. 90,830, dated June 1, 1869.

4,343.—CLOTHES-WRINGING HOOK.—James H. Pratt, Lynn, Mass., assignor to himself and Benjamin F. Larabee, same place.—Patent No. 112,074, dated February 21, 1871.

4,344.—HOSE-COUPLING.—James C. Cooke, Bridgeport, Conn., assignor to Albert F. Allen, Providence, R. I.—Patent No. 22,136, dated November 30, 1858.

4,345.—Division A.—FEED-WATER PIPE.—John Doyle, Baltimore, Md., assignor to himself and Anthony Raybold, Delaware City, Del.—Patent No. 110,753, dated January 3 1871.

4,346.—Division B.—FEED-WATER PIPE.—John Doyle, Baltimore, Md., assignor to himself and Anthony Reybold, Delaware City, Del.—Patent No. 110,753, dated January 3, 1871.

4,347.—MOLD.—William Hainsworth, Allegheny City, assignor of one-half interest to Sears M. Loveridge, Pittsburg, Pa.—Patent No. 109,894, dated December 6, 1870.

4,348.—SUSPENDER.—James B. Sharp, New York, and William Seymour, administrator of Robert M. Seymour, deceased, Sing Sing, N. Y.—Patent No. 59,465, dated November 6, 1866.

DESIGNS.

4,810.—COOKING-STOVE.—John Abendroth, New York, N. Y.

4,811.—CLAW-BAR.—David Christie, Chillicothe, Ohio.

4,812.—BOTTLE-STAND.—George Gill, Taunton, Mass., assignor to Reed & Barton, same place.

4,813.—TEA-POT.—George Gill, Taunton, Mass., assignor to Reed & Barton, same place.

4,814.—MATCH-SAFE.—George R. Hubbard, New York, N. Y., assignor to Bradley & Hubbard, West Meriden, Conn.

4,815.—COOKING-STOVE.—Jacob Louis Kuechler, Reading, Pa., assignor to Orr, Painter & Co., same place.

4,816.—STOVE.—John H. Keyser, New York, N. Y.

4,817.—OVEN.—John H. Keyser, New York, N. Y.

4,818.—PARLOR-STOVE.—John Martino and John Currie, Philadelphia, assignors to Orr, Painter & Co., Reading, Pa.

4,819.—PLATE FOR COOKING-STOVES.—Charles Noble, Philadelphia, Pa., assignor to Charles Noble & Co., same place.

4,820.—TYPE.—William H. Page, Norwich, Conn., assignor to William H. Page & Co., same place.

4,821.—STOVE.—La Forist Rollins, Bangor, Me.

4,822.—DRAWER-PULL.—Elbridge J. Steele, New Britain, assignor to Turner, Seymour & Judds, Wolcottville, Conn.

4,823.—COOKING-STOVE.—Jacob Steffe, Philadelphia, assignor to Orr, Painter & Co., Reading, Pa.

4,824.—SHOW-CASE.—Jacob D. Vredenburgh, Chicago, Ill.

4,825.—COOKING-STOVE.—George Wellhouse, Akron, Ohio.

4,826.—STOCKING FABRIC.—Thomas Dolan, Philadelphia, Pa.

4,827.—STOCKING FABRIC.—Thomas Dolan, Philadelphia, Pa.

4,828.—TALMA OR CLOAK GARMENT.—Eberhard Flues, Fort Washington (Whitemarsh Post Office), Pa.

4,829.—LAMP-BURNER.—Hiram W. Hayden, Waterbury, Conn., assignor to Holmes, Booth & Haydens, same place.

4,830.—LAMP-BURNER.—Hiram W. Hayden, Waterbury, Conn., assignor to Holmes, Booth & Haydens, same place.

4,831.—SPOON OR FORK-HANDLE.—Edward C. Moore, Yonkers, N. Y., assignor to Tiffany & Co., New York city.

4,832.—PATTERN FOR CUTTING DRESS-WAISTS.—Elizabeth P. Smith, Chicago, Ill., assignor to herself and Norman H. Sherburne, same place.

4,833.—PUBLIC URINAL AND WATER-CLOSET.—Frederick J. Smith, Chicago, Ill.

4,834.—STEAM-ENGINE.—Peter L. Weimer, Lebanon, Pa.

4,835.—RANGE.—Charles J. Wood, Baltimore, Md.

TRADE-MARKS.

222.—CASSIMERES.—Gallaghan & Brother, Philadelphia, Pa.

223.—MEDICINE.—Hostetter & Smith, Pittsburg, Pa.

224.—PAINT.—The Averill Chemical Paint Company, New York, N. Y, and Cleveland, Ohio.

225.—COTTON GOODS.—The Harris Manufacturing Company, Coventry, R. I.

226.—WHISKY.—Vidvard & Sheehan, Utica, N. Y.

EXTENSIONS.

SIDNEY S. HOGLE, of Berea, Ohio.—Letters Patent No. 16,866, dated March 17, 1857; reissue No. 804, dated August 30, 1859.

WILLIAM D. SLOAN, of New York, N. Y.—Letters Patent No. 16,936, dated March 31, 1857.

WILLIAM H. HOUSTON, of Peabody, Mass.—Letters Patent No. 16,947, dated March 31, 1857.

JEARUM ATKINS, of Mokena, Ill.—Letters Patent No. 9,479, dated December 21, 1852

HENRY R. REMSEN, of Albany, N. Y.—Letters Patent No. 17,012, dated April 7, 1857.

New Steel Process.

A PATENT has just been granted for the manufacture of a fine quality of steel from a mixture of several chemical salts with spathic, magnetic and hematite ores, graphite and peroxide of manganese, of which one or two per cent. is added to melted cast iron. Puddled balls or other blocks or pieces of metal are treated by sprinkling them with about one per cent. of the mixture, and afterwards drawing them out or welding them.

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CHARLES ROGERS, Solicitor and Manager.

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A COMPLETE PATENT AGENCY,

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We have engaged as solicitor and manager Mr. CHARLES ROGERS, a well-known expert in this department. Being a practical mechanic, and having been an examiner in the Patent Office at Washington for a number of years, besides enjoying an experience of more than twenty years as a solicitor of patents, Mr. ROGERS is intimately acquainted with all the details of the business, both in and out of the office.

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final Government fee	20
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When the patent is allowed	$20 to 30
Total	$30 to $40

the applicant paying such Government fees as may be required.

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Government fee	10
Total	$25

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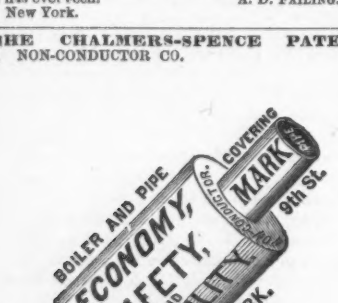

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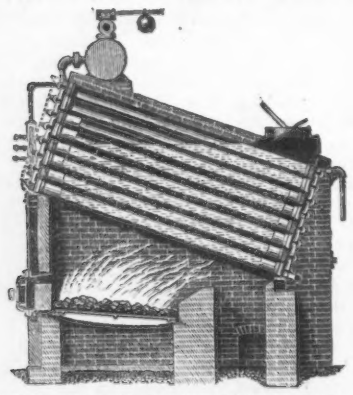

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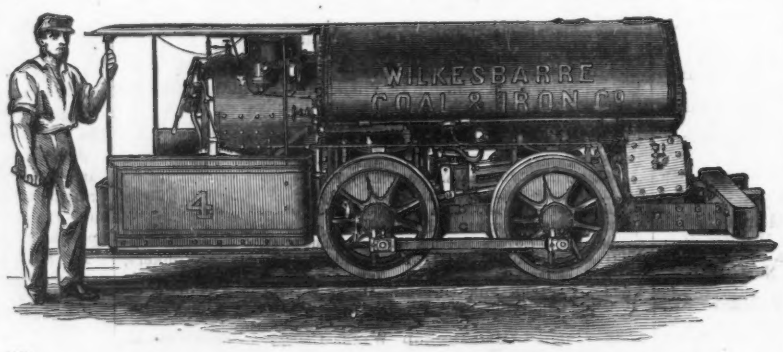

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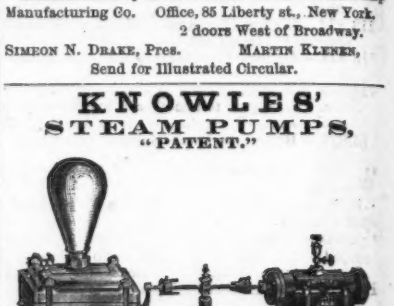

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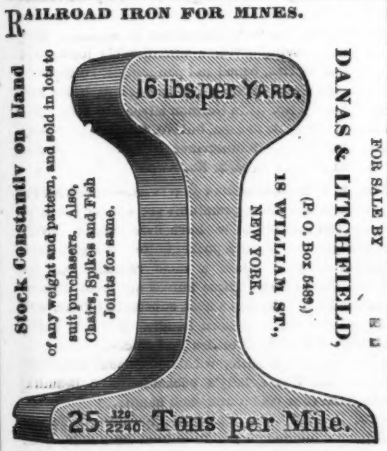

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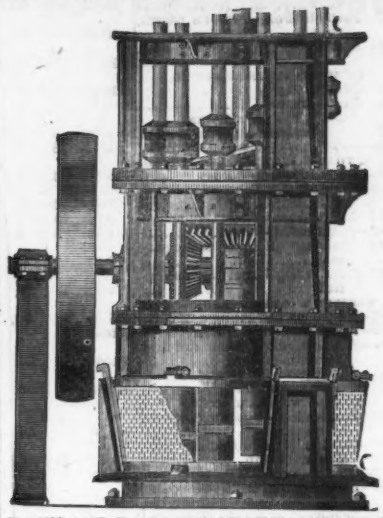

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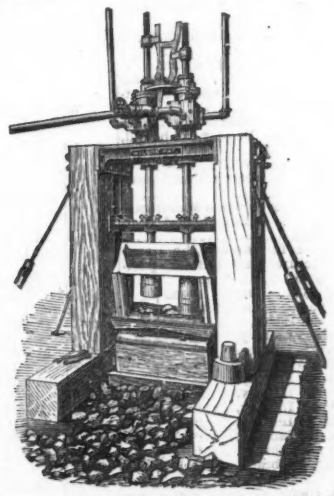

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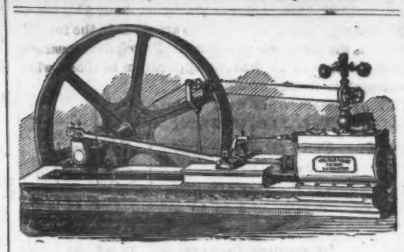

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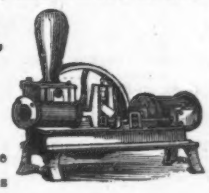

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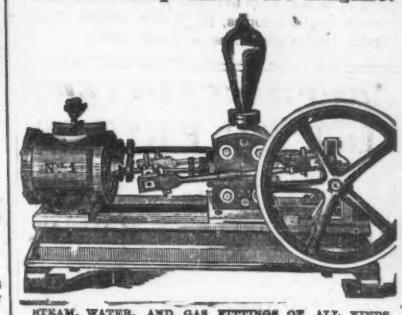

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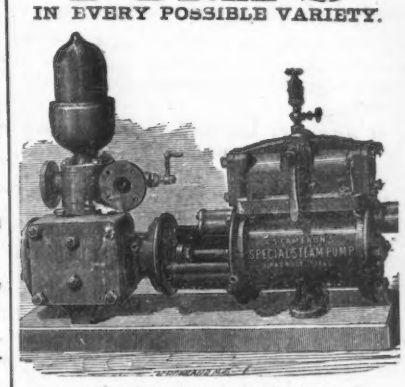

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The premiums range from twenty-five cents to twelve hundred dollars in value—the prices annexed are in no case exaggerated, but the actual cash value invariably—so that one who aims at a large premium will not lose his labor even if obliged by any cause to suspend his efforts, because it is never too late to decide what premium to select, and no list is too small to earn a valuable prize, or rather a choice of many valuable prizes.

Every class of persons can share in this profitable employment, at times, in ways and in places suited to their circumstances, and with rewards adapted to their different desires.

You never know what you can do until you Try.

Thousands of persons, of both sexes, once straitened and perplexed to get a living, have suddenly found out hat they had the gift to **get rich by canvassing!** Study the nature of the business, and particularly human nature; study the arguments and inducements for subscription to THE MANUFACTURER AND BUILDER, lay your plans well, and get every body to help you, and hen let nothing discourage or stop you.

In t following table is given the price of each article, and the number of subscribers required to get free, at $1 50 a year; also at the club rate of $1 a year. The descriptions of a few articles are given in the fourth column, the balance is given in our *Descriptive Premium Sheet*, which will be sent on application to those who contemplate getting up clubs.

List of Premiums and Terms for Vol. III., 1871.

A Free Field for Everybody. No Competition.

No.	*Names of Premium Articles.*	*Price of Premium.*	*Number of Subscribers required at $1 50*	*at $1*
	FROM PATTERSON & BROS.			
1—	Tool-Chest	$45 00	60	190
2—	Case Mathematical Instruments	9 00	18	55
3—	Case Mathematical Instruments	15 00	22	75
4—	Pocket Knife	1 50	4	21
5—	Pocket Knife	2 00	5	22
6—	Pocket Knife	2 50	6	25
7—	Lady's Pocket Knife	2 00	5	22
8—	One dozen Knives and Forks	14 00	21	70
9—	One dozen Knives and Forks	18 50	27	90
10—	One dozen Knives and Forks	22 00	33	110
11—	One dozen Knives and Forks	25 50	39	124
12—	Carver and Fork	5 00	13	37
13—	Fluted Sharpening Steel	2 50	6	25
	FROM HALL, ELTON & CO.'S PLATE.			
14—	One dozen Tea-spoons, medallion	5 75	14	40
15—	One dozen Table-spoons, medallion	12 00	19	65
16—	One dozen Table Forks, medallion	12 00	19	65
17—	Butter-Knife, medallion, solid	1 00	4	
18—	Soup-Ladle, medallion	5 75	14	40
19—	Ice or Water-Pitcher, No. 3	17 00	26	80
20—	Pocket Fruit-Knife, No. 12	2 00	5	22
21—	Revolving Butter-Cooler, No. 80.	8 00	16	52
22—	Cake-Basket, No. 1867	10 00	18	58
23—	Caster, 6 bottles, chased, No. 2039	9 25	18	54
24—	Fruit-Basket, No. 200	13 50	21	75
25—	Child's Cup, No. 041	2 75	6	25
26—	Knife, Fork, and Spoon, child's set, morocco case	3 00	8	30
27—	One dozen Napkin-Rings, medallion	9 00	17	54
28—	Tea Set, gold lined, No. 1822	48 00	52	180
29—	Tea Set, No. 1866	36 00	45	135
	FROM COLBY BROS. & CO.			
30—	Knife-Cleaner	75	2	
	FROM MARIE, TODD & CO.			
31—	Gold Pen and Pencil, rubber case	8 00	15	45
32—	Gold Pen and Pencil, rubber case	6 75	13	37
33—	Gold Pen, silver or gold holder, in box	4 25	9	32
34—	Gold Pen, extension gold case, in box	20 00	29	90
35—	Lady's Gold Pen, ivory holder, in box	2 75	6	25
	FROM HENRY RUSSELL & CO.			
36—	Downer Mineral Oil Lamp, No. 1956	4 75	10	35
37—	Downer Mineral Oil Lamp, No. 1956	9 25	17	56
	FROM C. F. A. HEINRICH.			
38—	St. Germain Student Lamp, largest size	8 25	15	45
	FROM FAIRBANKS & CO.			
39—	Family Scales	14 00	21	70
	FROM COLBY BROS. & CO.			
40—	Clothes-Wringer	7 50	10	35
	FROM ALEXANDER M. LESLEY.			
41—	Refrigerator, the Zero, No 38	38 00	42	142
42—	Cooler, the Newport, No. 1	12 00	15	45
43—	Hot-Air Coal Furnace, the Gothic, No. 9	125 00	135	450
44—	Hot-Air Wood Furnace, Gothic, No. 10	150 00	162	525
	FROM THE STANLEY RULE & LEVEL CO.			
45—	Iron Smoothing-Plane, Bailey's patent	5 00	13	37
46—	Iron Smoothing-Plane, Bailey's patent	6 50	14	42
47—	Iron Jack-Plane, Bailey's patent	7 50	15	47
48—	Iron Fore-Plane, Bailey's patent	9 00	17	55
49—	Iron Jointer-Plane, Bailey's patent	10 00	18	58
50—	Wood Smoothing-Plane, Bailey's patent	3 00	8	30
51—	Wood Fore-plane, Bailey's patent	4 50	10	35
52—	Wood Jointer-Plane, Bailey's patent	75	12	36
53—	Wood Jointer-Plane, Bailey's patent	50	14	40
	FROM POST & GODDARD.			
54—	Machinists' Hand-Taps	17 60	25	75
55—	Machinists' Hand-Taps	52 80	65	220
56—	Machinists' Hand-Taps (your choice)	5 00	12	37
57—	Screw-Plates and Dies, size A	8 00	15	45
58—	Screw-Plates and Dies, size B 1	10 00	18	58
59—	Screw-Plates and Dies, size C 1	13 00	20	70
60—	Screw-Plates and Dies, size D 1	3 00	7	25
61—	Tap-Wrenches, size A	4 00	9	30
62—	Tap-Wrenches, size B	5 00	12	37
63—	Tap-Wrenches, size C	17 00	26	80
64—	Set of 11 Taper Shank-Twist Drills, No. 1	19 75	29	90
65—	Set of 29 Drills, straight shank, mounted, No. 9	12 00	18	60
66—	Set of 60 Drills, steel wire gauge from 1 to 60, No. 12	8 00	15	45
67—	Set of 21 Taper-Shank Drills, No. 3	44 00	58	175
68—	Set of 9 Bit-Stock Drills, 1-16 to ¼ in	2 80	6	25
69—	Self-Centering Drill-Chucks, Beach's patent, for jewelers, No. 0	10 00	18	58
70—	Self-Centering Drill-Chucks, Beach's patent, for drilling, No. 0	7 00	14	40
71—	Self-Centering Drill-Chucks, Beach's patent, 0 to 3-16, No. 1	6 00	13	38
72—	Self-Centering Drill-Chucks, Beach's patent, 1 to 60 S. W. E., No. IX	7 00	14	40
73—	Self-Centering Drill-Chucks, Beach's patent, 0 to ½, No. 3	14 00	23	77
74—	Drill-Grinding Machine, No. 1	10 00	18	58
75—	Drill-Grinding Machine, No. 2	20 00	30	95
76—	Auger-Bits, your choice of 4 sets	— —	—	—
	FROM L. W. POND.			
77—	Foot-Lathe, No. 1	50 00	65	204
78—	Foot-Lathe, No. 2	30 90	47	124
	FROM COLBY BROS. & CO.			
79—	Miniature Steam-Engine and Boiler	1 36	5	23
	FROM RUSSELL & ERIE.			
80—	Steam-Engine (1 H. P.) and Boiler	300 00	310	1125
81—	Steam-Engine (3 H. P.) and Boiler	600 00	640	2250
82—	Steam-Engine (5 H. P.) and Boiler	800 00	858	3000
83—	Steam-Engine (10 H. P.) and Boiler	1200 00	1285	4500
84—	Steam-Pump, C. B. Hardick's, No. 0	120 00	155	540
85—	Steam-Pump, Cameron & Co.'s, No. 1	150 00	192	675
86—	Steam-Pump, Cameron & Co.'s, No. 2	200 00	257	900
87—	American Submerged Pump	12 00	19	65
	FROM GEORGE TALLCOT.			
88—	Turbine Water-Wheel, Reynold's, 12 in.	105 00	125	360
89—	Turbine Water-Wheel, Reynold's, 24 in.	226 50	270	800
90—	Turbine Water-Wheel, Reynold's, 36 in.	384 50	460	1350
91—	Rotary Blower, Root's patent, No. 1	$50 00	70	275
92—	Rotary Blower, Root's patent, No. 2	80 00	105	420
93—	Portable Forge, Root's patent, No. 1	48 00	65	260
94—	Portable Forge, Root's patent, No. 3	80 00	105	420
	FROM THE AMERICAN SAW CO.			
95—	Circular Saw	125 00	135	473
96—	Cross-Cut Saw	6 6	14	42
	FROM A. P. & M. STEPHENS.			
97—	Labor-Saving Vise, 2-in. jaw	4 00	9	32
98—	Labor-Saving Vise, 4½-in. jaw	12 00	28	58
	FROM THE STANLEY RULE & LEVEL CO.			
99—	Boxwood two-foot Rule	2 50	6	25
100—	Silver-Plated Triangular Drawing-Scale	6 00	16	52
101—	Pocket Sheet-Metal Gauge	5 00	13	37
102—	Arkansas Oil-Stone	1 75	5	22
103—	Arkansas Oil-Stone, mahogany case	3 25	8	30
104—	Gear or Cog-Wheel Calculating-Rule	4 00	12	36
	WESTERN & COMPANY'S AGENCY.			
105—	Preparing and Filing a Caveat	25 00	28	80
106—	Application for a Patent	30to40	35	100
107—	Application for Patent and first Government fee	46to56	50	150
108—	Application for Patent and all Government fees	66to76	75	250
	FROM J. W. HUTCHINSON.			
109—	English Breech-loading double-barrel Gun	100 00	110	350
110—	English Muzzle-loading double-barrel Gun	75 00	85	250
111—	Breech-loading Rifle, the Allen	30 00	46	150
112—	Revolver, Smith & Wesson's, No. 1½	12 50	19	65
113—	Revolver, Smith & Wesson's, No. 2	15 00	22	75
	FROM MASON & HAMLIN.			
114—	Melodeon, portable, No. 1, 4 octave	50 00	66	200
115—	Melodeon, resonant, style G, 5 octave	170 00	146	510
116—	Pipe-Organ, church use, style No. 29	675 00	579	2000
	FROM J. S. & C. ODELL.			
117—	Pipe-Organ,	500 00	430	1500
118—	Pipe-Organ	700 00	600	2100
119—	Bradbury Square Piano-Forte, No. 4	650 00	430	1500
120—	Steinway's No. 1 Grand Piano	1200 00	860	3000
	THE AMERICAN WATCH CO., WALTHAM, MASS.			
121—	Silver Watch	20 00	32	100
122—	Silver Watch	35 50	48	142
123—	Gold Watch	50 00	65	200
124—	Lady's Gold Watch	100 00	110	350
	FROM THE UNITED STATES WATCH CO.			
125—	Silver Watch	40 00	50	150
126—	Silver Watch	66 00	75	275
127—	Gold Watch	100 00	100	300
128—	Silver Watch	104 00	104	312
129—	A Sewing Machine (your choice)	63 00	65	200
	FROM MCALLISTER.			
130—	Microscope and 48 objects	10 00	14	40
	FROM COLBY BROS. & CO.			
131—	Velocipede for Boys	16 00	16	52
	FROM MCALLISTER.			
132—	Magic-Lantern, No. 433	20 00	30	95
	FROM H. THOMPSON.			
133—	An Easy Chair			
	FROM D. APPLETON & CO.			
134—	New American Cyclopædia, 16 vols.	80 00	80	213
	FROM G. & C. MERRIAM.			
135—	Webster's Unabridged Pictorial Dictionary	12 00	15	45
136—	Webster's National Pictorial Dictionary	6 00	10	35
	FROM WESTERN & COMPANY.			
137—	One back vol. Manufacturer and Builder, unbound, post-paid	1 75	6	25
138—	Two back volumes Manufacturer and Builder, unbound, post-paid	3 50	11	37
139—	One back vol. Manufacturer and Builder, bound, post-paid	2 50	9	32
140—	Two back volumes Manufacturer and Builder, bound, post-paid	5 00	18	58
141—	Cover for binding the Manufacturer and Builder, post-paid	60	3	21
142—	A $10 Library (your choice from list in special sheet),	10 00	18	58
143—	A $15 Library,	15 00	24	85
144—	A $20 Library,	20 00	31	106
145—	A $25 Library,	25 00	38	125
146—	A $30 Library,	30 00	44	144
147—	A $35 Library,	35 00	50	162
148—	A $40 Library,	40 00	56	177
149—	A $45 Library,	45 00	62	192
150—	A $50 Library,	50 00	68	207
151—	A $60 Library,	60 00	80	237
152—	A $75 Library,	75 00	100	282
153—	A $100 Library,	100 00	125	360
154—	A choice of good Books (see terms in another column)			
155—	A choice of convenient Book-Cases (see special sheet)			
156—	A choice of popular Music (see terms in special sheet)			
157—	A choice of Games and Toys, (see terms in special sheet)			

All paid through by mail or express.

We have taken especial pains to select in making up our price list the NEWEST and very BEST articles. No charge will be made for boxing or packing any article on our list. The Premiums, Nos. **4** to **7** inclusive, **31** to **35** inclusive, **71** **99**, **101**, **105** to **108** inclusive, **121** to **128** inclusive, **137** to **141** inclusive, **154**, **156**, **157**, will each be delivered FREE of charge by mail or express (at the Post-office or express office nearest recipient) to any place in the United States or Territories. The other articles cost the recipient only the freight after leaving the manufactory of each, by any conveyance specified.

As an aid to those who engage upon large clubs, we will count subscriptions by *one* individual for 1869, 1870, and 1871, as *three* subscribers toward a premium. Every *new* subscriber should have the work from the beginning. Bound volumes may be counted in the same way—each as one subscriber—except, of course, when they are obtained as a premium.

Do not fail to note the following Points:

1. All subscribers sent by one person count, though from one or a dozen different post-offices. But

2. State with each name or list of names sent that it is for a premium.

3. Send the names as fast as obtained, that the subscribers may begin to receive the paper at once. You can have any time, from one to six months, to fill up your list.

4. Send the exact money with each list of names, so that there may be no confusion of money accounts.

5. Old and new subscribers all count in premium clubs, but a portion, at least, should be new names; it is partly to get these that we offer premiums to canvassers.

6. Specimen numbers, cards, and show-bills will be supplied free, as needed by canvassers; but they should be used carefully and economically, as they are very costly.

7. Remit money in Checks on New York banks or bankers, payable to order of WESTERN & COMPANY, or send Post-Office Money Orders. If neither of these is obtainable, Register Money Letters, affixing stamps both for the postage and registry; put in the money and seal the letter in the presence of the postmaster, and take his receipt for it. Money sent in any of the above ways is at our risk.

DESCRIPTIVE LIST OF PREMIUMS.

Every Premium in the annexed list is described in the December MANUFACTURER AND BUILDER, *and also in a* **Special Descriptive Sheet,** *which will be sent* **free** *to every one desiring it. We have room here for the following only:*

No. 1—Chest of Good Tools.—We are able, through the special favor of Messrs. Patterson Brothers, of 27 Park Row, to offer chests of the very finest quality of tools, of kinds and prices named below. Similar tools could be purchased for half the money; but these are all A No. 1, for practical use, and worth a dozen common articles. For this we have the guarantee of Messrs. Patterson, which is amply sufficient for us, and for all who know them. Any of these tools may be ordered of them. We make up only a single premium, which contains a full assortment for all common purposes. The tools are of regular size, and but few additions would be required for a journeyman carpenter. The assortment we offer is as follows: 1 tool-chest, $8; 1 jack-plane, $1 75; 1 smooth-plane, $1 50; 1 fore-plane, $2 25; 1 handsaw, 22 in., $1 75; 1 compass saw, 10 in., 50c.; compass, 6 in., 37c.; 1 adze-eye hammer, No. 4, $1 25; 1 hatchet, No. 2, 90c.; 1 draw-knife, 7 in., $1 12; 1 try-square, 6 in., 70c.; 1 bevel, 8 in., 75c.; 1 chalk-line and spool, 30c.; 1 mallet, 30c.; 1 pair of pliers, (steel,) 5 in., 60c.; 1 pair of calipers, 4 in., 38c.; 1 brace, No. 2, $2 25; 1 auger-bit, ea., ¼ in., 30c.; ½ in., 32c.; ¾ in., 45c.; 1 in., 60c.; 1 centre-bit, ea., ½ in., 21c.; ¾ in., 23c.; 1 in., 25c.; 1¼ in., 35c.; 1½ in., 40c.; 6 gimlet-bits, assorted, 90c.; 3 gimlet-bits, assorted, 33c.; 1 screw-driver bit, 25c.; 1 flat countersink, 25c.; rose, do., 25c.; small, do., 25c.; 1 octagon reamer, 30c.; 1 taper-bit, 30c.; 1 screw-driver in handle, ea., 3 in., 30c.; 6 in., 50c.; 1 gouge in handle, ea., ½ in., 50c.; 1 in., 60c.; 1 chisel in handle, ea., ¼ in., 30c.; ½ in., 35c.; ¾ in., 40c.; 1 in., 50c.; 1¼ in., 60c.; 1 framing-chisel, ea., ¾ in., $1; 1 in., $1 10; 1¼ in., $1 20; 1 auger, ea., ¾ in., 70c.; 1 in., 80c.; 1¼ in., 90c.; 1 set brad-awls in handles, $1 35; 1 rule, 2 feet, 25c.; 1 saw file, ea., 4 in., 14c.; 5 in., 17c.; 1 flat bastard file, 8 in., 30c.; 1 wood-rasp, 50c.; 1 soldering copper, 60c.; solder nails, etc., $1 25;—**$40 00.**

Nos. 2, 3—Mathematical Instruments for Draughting, Drawing, Etc.—Very convenient not only for architects and mechanics, but for boys and girls. These are neatly fitted in beautiful rose-wood cases, having dividers with flexible joints, and points, semi-circles, pencil and penholders, rulers, etc., etc. All the pieces in No. 2 are finished in brass and steel; those in No. 3 are German-silver and steel. The pieces are the same in each, but No. 3 is of extra beauty and workmanship. 18 subscribers at $1 50 each secures No. 2, and 22 at $1 50 each, No. 3.

Nos. 4, 5, 6, 7—Pocket Knives.—Here's for the boys and girls. These premiums are among the most pleasing and useful that we have ever offered. Every boy, and girl too, wants a pocket knife. We give them an opportunity to obtain a most valuable one for merely a little effort. These knives are from Messrs. Patterson Bros. No. 4 is a neat, substantial knife, with three blades and buck-horn handle. No. 5 is a still finer article, with four blades and buck-horn handle. No. 6 is an elegant knife, with four blades and shell handle. No. 7 is a lady's pocket-knife, a beautiful article, with four blades and shell handle.

Nos. 8, 9, 10, 11, 12, 13—American Table Cutlery.—We are glad to be able to offer really good articles of American manufacture, such as are competing successfully with the best foreign goods. ***Messrs. Patterson Bros., 27 Park Row,*** who supply us with these articles, are also importers of English goods. They recommend these knives, manufactured by the ***Meriden Cutlery Co.,*** as equal to any cutlery in the market, and their recommendation is a guarantee wherever they are known. We offer four kinds knives, and three sizes of each kind. No. 8 have rubber handles, which are actually boiling-water-proof, so that, if they were accidentally to remain in it for several minutes, or even hours, they would not be injured. The blades are of the best steel, and warranted Dessert size, with forks, sold at $14. For 23 subscribers at $1 50, or 78 at $1, we will give either the medium size or the table size, sold at $15 50. No. 9 have ivory handles, are selected with great care, have steel blades, and are beautiful goods. Dessert size, with forks, sold at $18 50. For 31 subscribers, at $1 50, or 100 at $1, we will send the medium size, sold at $20 50. For 34 at $1 50, or 112 at $1, we will send the table size, sold at $22 50. No. 10 are made of solid steel, and are triple plated all over with pure silver, which will wear for a long time, while the knife is actually indestructible by ordinary use. Dessert size, with forks, sold at $22. For 37 subscribers, at $1 50, or 118 at $1, we will give the medium size, sold at $24 50. For 38 at $1 50, or 120 at $1, we will send the table size, sold at $25. For 38 at $1 50, or 120 at $1, we will send the table size, sold at $25, No. 11 have steel blades, triple-plated with silver, and larger ivory handles, and are really splendid goods. Dessert size, with forks, sold at $25 50. For 42 subscribers, at $1 50, or 128 at $1, we will give the medium size, sold at $28. For 45 subscribers at $1 50, or 143 at $1, we will give the table size sold at $30 50. The forks, which accompany these premiums, Nos. 8, 9, 10, are made of genuine albata, and warranted double-plated with coin-silver. The forks with No. 11 are warranted triple-plated with coin-silver. These forks are also furnished to us by Messrs. Patterson Bros. The carving-knife and fork, and fluted steel, are made by

PUBLICATIONS.

the Meriden Cutlery Co., with the best ivory balanced handles.

Nos. 14 to 29—Silverware for the Table.—What would become of elegance and refinement in the furnishing of homes if the ladies (God bless them!) had not such an amiable passion for endlessly beautifying everything around them? Ever since Eve first set out the fruit of Paradise on its broad leaves to entertain the angel guests of Adam, it has been the province of her lovely daughters to spread the social board with attractions still more tempting to the eye than to the palate. What that becomes a woman, will not a woman do to make her table shine? We condole with them that their means are not always equal to their good taste, and propose that henceforth no lady shall lack a lustrous silver tea-set, or other piece of similar elegance, unless she chooses to. Look at the following premiums, all of the celebrated manufacture of Messrs. HALL, ELTON, & Co., 36 Park Row, New York; No. 28 is silver-plated, gold-lined, beautifully chased **Tea Set** of six pieces, consisting of a coffee-pot, two teapots, a creamer, a sugar-bowl, and a slop-bowl. The style of this set is very neat, new and elegant. Messrs. Hall, Elton & Co, warrant these goods to be their best triple plate. This is a very desirable premium. No. 29 is a tea-set with same number of pieces, triple-plated, plain, new style.

Nos. 31, 32, 33, 34, 35—GOLD PENS. Rubber Mounted with Ever-Pointed Pencils—Pens in Gold and Silver Holders—Pens and Pencils in Extension Cases.—No. 31 has a gold-mounted rubber case, with pencil, and a No. 4 gold pen, manufactured by MABIE, TODD & Co., 180 Broadway, New York. This and the next, No. 32, are we think, really the best things of the kind manufactured. The fact that hard rubber is used, shows that the gold for the mountings, etc., is of the finest quality, as rubber, on account of the sulphur contained in it, can not be mounted with any other without tarnishing. When closed, the pencil No. 31 is only 5 inches long, (No. 32, 3½ inches,) but it opens to a length of 5¾ inches. The price for the holder and pencil of No. 31 is $6, pen $2; and of No. 32, or smaller size, $5 for the case, and $1 75 for the pen. Fifteen subscribers will give you the former, or gentleman's size, and 13 the latter, or lady's size. No. 33 is a No. 6 gold pen, with silver or gold-plated holder with an ebony handle—a very neat, desirable business-pen. By describing the kind of pen you prefer, we can probably select one that will suit your hand perfectly. We send these by mail, in a neat turkey morocco box, lined with velvet, in which they can be kept, protected from injury. No. 34 is a large pen, in a fine extension case, round or fluted, and richly engraved. The gold is 14 carats fine. These pens, which are nicely put up in boxes, are a very beautiful thing for a present. Price $20, and sent, postage paid, to any address, upon receipt of 29 subscribers at $1 50 each. No. 35 is a lady's gold pen, with ivory holder. Price, $2 75. This is indeed a very neat and beautiful pen for ladies' use. We send it, postpaid, by mail, inclosed in a handsome velvet-lined morocco box, for 6 subscribers.

No. 38—The Celebrated St. Germain or German Student's Lamp.—as it is sometimes called. This lamp is made and furnished to us by C. F. A HINRICHS. It scarcely needs eulogium, being the standard thing in our leading colleges, both among students and professors. They reject gas, even where it is most plentiful and convenient, and save their much-worked eyes by the motionless pure white light for which this lamp is so remarkable. No other artificial illumination approaches so nearly to the still colorless sunlight. The secret is in the scientific adaptation of burner and chimney to produce that perfection of draught by which absolute combustion is attained without vibration. The porcelain shade softens the light most agreeably. The lamp slides on a vertical standard, and is adjusted by a set-screw at any desirable elevation to accommodate the work or the eyes. The reservoir is elevated above and at a short distance from the burner, (communicating by a pipe,) so that the oil is always cool and out of reach of flame. The reservoir can be taken out of its telescopic socket, and carried away to another room and filled and returned, without putting out the light. The lamp will be a treasure worth no little trouble to obtain to any one who needs strong light, or who values eye-sight, economy, neatness, pure air, and freedom from trouble and annoyance with lamps; as in all these points it is without a peer. The price of these lamps is $8, with 25 cents for packing. The mineral sperm oil can be had from most respectable dealers, or ordered in packages of any size (1 gallon upward) from Messrs. HENRY RUSSELL & Co., 38 Park Place, New-York.

No. 39—Family Scales.—These scales combining the advantages of counter and platform scales, are peculiarly adapted to household purposes. They weigh from ¼ ounce to 240 lbs. They have a scoop or pan for weighing flour, sugar, and other house stores, and a platform for heavier articles, and are just such an apparatus as is needed for in-door or out-door use, occupying less than two feet square. These scales are manufactured by the well-known FAIRBANKS & Co., No. 252 Broadway New York, whose weighing apparatus has long ranked as the standard in all parts of the country. Send to them for circulars, if desired.

Nos. 45-53—Bailey's Patent Planes.—To those who have used these planes and know their value, it is but small praise to say that they are superior to any others made. They are so far ahead of any others that there can be no comparison between them. They are self-adjusting in every respect. Both the wood and iron planes are entirely independent in themselves, requiring neither hammer, screw-driver, nor wrench to replace or adjust the cutter, which is held firmly in place and can be instantly released by use of the cam and its thumb-piece. The cutter is adjusted by simply turning a thumb-screw under the bed-piece upon which the plane-iron rests. By this the cutter can be adjusted to any thickness of shaving. The Stanley Rule and Level Co., 55 Chambers Street, New York, warrant these planes to be of the best stock and finish. The various numbers and sizes of these planes which we offer give carpenters, mechanics, and others desiring them, an opportunity to get a complete set of either the wood or iron planes as premiums. The smooth planes, of which we offer two sizes, are 6½ inches long, 1¾ inch cutter; and 8 inches long, 1¾ inch cutter.

Jack plane..	.....14 in. long,	2	in. cutter.	} Iron.
Fore "	.....18 " "	2¾	" "	
Jointer "	.....22 " "	2¾	" "	

In the wood planes the lengths and widths of cutter embrace all sizes made. Forty-four subscribers at $.50 each, or 141 subscribers at $1 each, will get a complete set of the wood-planes. Sixty-nine subscribers at $1.50 will get a complete set of the iron planes, which will last a life-time. If larger sizes than those given are wanted, a few extra subscriptions will be required, according to the difference in the price.

Nos. 54-76—Machinists' Tools.—This series of premiums, consisting of machinists' tools, etc., has been selected and put up at the suggestion of several practical men with whom we have consulted in regard to the subject. These gentlemen, who have a practical knowledge of the tools, and of the requirements of all who have any thing to do with the working of metals, give their unqualified approval of the tools we have selected. This list of premiums has been made so extensive that every man who has any industrial operations to carry on will find some tool or tools absolutely necessary to him. By sending us clubs of subscribers to THE MANUFACTURER AND BUILDER these tools may be obtained by the smallest possible amount of labor. Of the qualities of these tools, in point of finish, we know them to be the best in the market—the best, without challenge. When a man has a set of any of them in his tool-chest, he knows he has the means of producing work equal to any that can be done. We obtain these tools from the general agents, Messrs. LOST & GODDARD, 109 Liberty Street, New York.

No. 77—Foot-Lathe No. 1.—Of these useful articles we offer two kinds. No. 1 is perfectly adapted for most kinds of turning in wood or metals; also drilling, boring, polishing, sawing, etc. It seems to be the size desired by most people. This is proved by the great numbers of them sold. This lathe takes a piece between centres 19 inches long and 6¼ inches wide in diameter. It weighs 200 pounds. It is fitted with two pointed centres, one spur-centre, face-plate turned and polished, two rests, one 9 and the other three inches long; also centre key and wrench combined, which fits the screw heads in different parts of the lathe. The balance-wheel weighs 45 pounds, is turned true, and is polished. It has two sizes for change of speed. This size of lathe has a great many extra parts made for it, so that whenever they are wanted they can be obtained. This is a very valuable point, as in buying other machines of the kinds only such things as happen to fit can be used, and they are not always to be found when wanted. The Rev. JOHN TODD, D.D., speaking of lathes, says in regard to these, "For price, for finish, for beauty and workmanship, I have never seen any American lathe so desirable. Of the No. 1 he says: "Nobody can own the lathe without daily gratitude." We procure these lathes through Mr. LUCIUS W. POND, 98 Liberty street, the well-known manufacturer of machinists' tools. Few people can obtain one of these lathes more easily than by obtaining 65 subscribers for THE MANUFACTURER AND BUILDER, for which we ship this premium, without any additional charge for boxing. The regular price is $50. We include leather belt 8 feet long, which costs 90 cents in the price given in the table.

No. 78—Foot Lathe, No. 2.—Our subscribers are frequently asking for second-hand lathes, saying at the same time that such a one would answer their purpose, and probably come cheaper. There are many others who do not care for so complete a lathe as No. 1. The No. 2, we think, will answer this demand. It is made of cheaper materials, but in the same style as lathe No. 1. The frame is of wood, with curved legs, which give it a neat and attractive appearance. It is painted and ornamented in the best style. The bed is made with iron slides three feet long. Will take a piece between centres 21 inchhes long and 6¼ inches in diameter. It has an iron pulley like No. 1. The spindle runs accurately. The face-plate takes off, and the centres are fitted to tapering sockets. Tailstock spindle traverses with a left-hand screw. Everything is well fitted and finished. The balance-wheel is the same pattern as for lathe No. 1, and is turned true. The lathe, with face-plate, long and short T rests, two pointed centres, spur-centre, and wrench, packed for transportation, costs $30. For this we also include the leather belt, 8 feet long, which is used on the driving wheel. We box this lathe and deliver it on the cars for a club of 47 subscribers at $1 50 each, or 124 at $1. The twist-drills and chucks—premiums 65, 66, and 69 to 73—especially the smaller sizes, are just the things for these lathes. The chucks, No. Or, 2 and 3, cost $2 extra for fitting in the lathe. Those desiring further information in regard to the premium may send to WESTERN & Co., 37 Park Row, New York, for an illustrated pamphlet.

No. 79—The Dollar Steam-Engine.—This is a real working steam-engine and boiler, which runs half an hour, or until its fill of water is evaporated, by means of a small spirit-lamp, which forms a part of it. It can not explode or get out of order. A most instructive as well as entertaining toy. Sent, prepaid, for 5 subscribers at $1 50. It is manufactured by COLBY BROTHERS & Co.

Nos. 80, 81, 82, 83—Compact and Powerful Portable Steam-Engine and Boiler.—BAXTER'S patent is acknowledged by many experienced engineers to be the most perfect combination, of standard principles exclusively, and thorough workmanship, ever made in a portable engine. At the same time such is its compactness and the scale and system on which it is manufactured, (by the Colt Armory, at Hartford, Ct.,) that it is afforded at the lowest price ever known for the same (actual) power. It is made by machine tools constructed expressly for it, of standard interchangeable parts throughout, like the celebrated American watches. Consequently we are able to make it one of our most attractive and valuable premiums. Besides, it is warranted to consume less fuel per horse-power than any other engine. This is in consequence, partly, of the improved arrangement of the boiler and the cylinder being entirely let into the steam-space, to save room and heat. The one-horse engine and boiler (which, like the others, will run above, not below rated power) stands but five feet high, over all, by two feet in diameter. This is premium No. 80, costs $300, and can be had for 320 subscribers at $1 50 each, or 1125 at $1 each. The five-horse engine and boiler stands 6½ feet high by 3 feet in diameter, costs $800, and can be had for 858 subscribers at $1 50 each. The ten-horse engine costs $1200, and will run a good sized manufactory. There is now no reason why any body should be without a first-class steam-engine, especially as these engines are so simple, snug, safe, and economical of fuel that they can be run in any apartment by the fire required to warm it, and by and person of common intelligence, and will be received from the factory in perfect readiness for use. For running small lathes, drills, etc., circular and scroll saws, printing-presses, corn-huskers, cider-mills, fanning-mills, feed-mills, cotton-gins and hullers, cheese-presses, churns, pumps, washing-machines, sewing-machines, rotary blowers for forges and other purposes, etc., the smallest of these engines will be found thoroughly effective, and as little incumbrance and trouble as a kitchen stove. For business, however, we recommend to try for one of ample rather than of bare sufficiency.

Nos. 84, 85, and 86—Steam-Pumps.—These steam-pumps are of the best class and quality, economical in the use of steam, and capable of being applied in various ways. No. 84 is one of Hardick's manufacture, which took the first prize at the Fair of the American Institute a year ago. Nos. 85 and 86 are two sizes of the celebrated Cameron pump. Nos. 1 and 2. The first has a steam cylinder 4½ by 7 inches, and its capacity of ordinary speed is 15 gallons per minute, and costs $150. Size No. 2 has a steam cylinder 6 inches in diameter, with 8-inch stroke. It costs $200, and is capable at ordinary speed of delivering 30 gallons of water per minute. These pumps are remarkable for their compactness, simplicity, and durability. The valves are large and not liable to become choked up. By simply removing the bonnet, access can be had to them for inspection or repair,

Nos. 105 to 108—To Procure a Patent without Money.—We have met with many having valuable inventions, which inventors are anxious to get patented, but are unable to afford the expense, and consequently fail to secure the profits which a patent might produce. To such as are in this position, we make the following liberal offer: No. 108—We will prepare an application for a patent, attend to its passage through the Patent Office, and pay all government fees and incidental expenses attending the same, for any inventor presenting a patentable invention, who will get up a club of seventy-five subscribers for THE MANUFACTURER AND BUILDER for one year at $1,50 each, or 250 at $1 each, and send us the money by post-office order. If this application should be rejected, they may send us an additional list of thirty subscribers at $1.50 each, and the subscription money for the same, on receipt of which we will prepare and prosecute a second application, paying all government fees and incidental expenses. No. 107—For a list of fifty subscribers at $1.50 each, or 150 at $1 each, with the cash accompanying it, we will prepare an application, attend to its passage through the office, and pay the government fee ($15), the applicant paying the second government fee of $20. No. 106—For a list of thirty-five subscribers at $1.50, sent in the same way, we will prepare and prosecute an application, the applicant paying the government fee of $10 on such appeal. If the inventor has no model to accompany his application, he may procure additions. subscribers, the premium on which (see cash rates) will enable him to pay for the model. A club of 100 names has been obtained in a single establishment where from 150 to 200 hands are employed. A village of 500 inhabitants will take this number readily.

No. 129—Sewing Machines.—Your choice! A $65 machine for 65 subscribers, at $1.50 each.—It makes no difference to us which machine we send, or whether it is selected at first or at the last moment. No charge for boxing the machines; they go safely as freight. For circulars, giving full particulars in regard to style of machines, fixtures, etc., as well as instructions, send to **Grover & Baker Manufacturing Co.**, 495 Broadway, New York; **Florence Sewing Machine Co.**, 505 Broadway, New York; **Wilcox & Gibbs Sewing Machine Co.**, 658 Broadway, New York; **Singer Sewing Machine Co.**, 458 Broadway, New York.

Nos. 137, 138—Volumes of the Manufacturer and Builder.—The unbound volumes of THE MANUFACTURER AND BUILDER consist of a set of numbers for a year, each separate in its own paper cover. These volumes amount to a valuable Library on all matters pertaining to the Industrial Arts, and contain more varied information on manufacturing building, and mechanical subjects than can be obtained in books costing three times as much. The price of the volumes unbound is $1.50 each, at the office, or $1.75 if sent by mail, as they must be post-paid. They are profusely illustrated, the engravings used in them having alone cost thousands of dollars. For ordinary use, the sets of numbers unbound will answer quite well.

Nos. 139, 140—Bound Volumes of the Manufacturer and Builder.—*New* subscribers almost invariably desire to secure the back numbers of THE MANUFACTURER AND BUILDER from its commencement. Some desire them bound in our uniform style, while others prefer to get the loose numbers and have them bound to suit their own tastes. *Our* binding is very neat, and being done in large quantities at one time, is furnished at a *very cheap* rate. It is moreover very handsome, being of cloth, with gilt title and back, sides embossed and ornamented with a neat architectural device stamped in gold. The price of the volumes is $2.50 each, sent post-paid.

No. 141—Covers for Binding the Manufacturer and Builder.—These are described in premium 139, 140. Now ready for 1869 and 1870. Be careful to state *which year* you require. Any country binder will insert the year's numbers in one of these covers at a moderate cost. Price, 50 cents; sent, *post-paid*, on receipt of three subscribers at $1,50 for each cover.

Nos. 142 to 154—Good Libraries.—In these premiums we offer a choice of books for manufacturers, mechanics, artisans, builders and others. The person entitled to any one of the premiums 142 to 153, may select any books desired from the list published in our Special Premium Sheet, to the amount of the premiums, and the books will be forwarded, post or express paid. $25 or $50 worth of books pertaining to the industrial arts will give the boys new ideas, set them to thinking and observing, and thus enable them to make their heads help their hands. Any good book will, in the end, be of far more value to a youth than to have an extra hundred dollars on coming to manhood. ☞ Let the mechanics of a neighborhood unite their efforts, and through these premiums get an industrial library for general use.

No. 154—General Book Premium.—Any one sending twenty-five or more names may select books from our list to the amount of ten cents for each subscriber sent at $1; or thirty cents for each name sent at $1.20; or sixty cents for each name at $1.50. *This offer is only for clubs of twenty-five or more. The books will be sent by mail or express, prepaid through by us.*

SPECIMEN COPIES, CIRCULARS, SHOW BILLS, etc.,

will be furnished free of charge in sufficient quantities to meet the reasonable requirements of agents. We would respectfully request that they do not waste them, but distribute them judiciously. If some unexpected event should prevent them from continuing in the business, they will do the square thing by us by giving their outfit to some friend, who will continue the business where they have left off; and who will no doubt be grateful for the opportunity of receiving profitable employment.

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Every subscriber pays his own postage at the office where he receives the paper. This is only twenty-four cents per year, or six cents per quarter, payable in advance.

Don't Give up Your Town

until everybody has been supplied with a circular and has had a chance to subscribe; and be sure that you leave your address, so that they may know where to find you in case they should make up their minds to take the magazine after you have left them. Make all drafts, money-orders, and registered letters payable to the order of Western & Company, publishers, and address all communications

WESTERN & COMPANY, Publishers,
NO. 37 PARK ROW, NEW YORK.

TABLE OF CASH PREMIUMS For 1871.

EVERY MAN HIS OWN PAY-MASTER. STEADY EMPLOYMENT AND GOOD PAY.	PREMIUMS. At $1 50 each.	FREE At $1 00 each
For every club of 4 subscribers.....	$1 00	
" " " 10 "	3 00	
" " " 15 "	6 00	
" " " 20 "	10 00	
" " " 30 "	16 50	$1 50
" " " 40 "	24 00	4 00
" " " 50 "	32 50	7 50
" " " 75 "	48 75	11 25
" " " 100 "	65 00	15 00
" " " 200 "	140 00	40 0
" " " 500 "	350 00	100 00
" " " 1000 "	700 00	200 00

INTERMEDIATE CLUBS.

It often happens that clubs are made up of numbers that are not found in the above table. Names may be added to clubs at the following rates:

In clubs of	4	and less than 10..	$1 25	for each name.		
" "	10	" " 15..	1 20	"	"	
" "	15	" " 20..	1 10	"	"	
" "	20	" " 30..	1 00	"	"	
" "	30	" " 40..	95	"	"	
" "	40	" " 50..	90	"	"	
" "	50	" " 200..	85	"	"	
" "	200	" " 500..	80	"	"	
" "	500	" " 1000..	80	"	"	
" "	1000	and over.....	80	"	"	

The Profits of the Cash Business, it will be seen by the above tables, are large and accrue rapidly. Every experienced canvasser knows that it is far easier to obtain 4 subscribers to a paper like THE MANUFACTURER AND BUILDER at $1 50 each than to get 1 subscriber to a high-priced magazine, costing $6. This is more strikingly evident when the fact is taken into consideration that our paper, costing only $1 50, is ACTUALLY SUPERIOR IN EVERY RESPECT TO ANY THING OF THE KIND IN THE COUNTRY COSTING TWICE THAT SUM.

There is another point in favor of our Magazine, as compared with a higher-priced periodical. This is the well-known fact, that in a manufacturing establishment, or even in a town, the working-men will rarely look at a paper costing $3 or $6, and the result is that only rich persons, comparatively, and proprietors can be solicited with any success. Now, these persons are scarce in any community; and a paper that comes within the means and comprehension of the masses or majority of the people, of course commands an immensely wide field. Hence, instead of getting only the proprietor of a manufactory, or the rich men of a town, the working-men can be approached with success; and out of a single establishment as many as 100 subscribers have easily been obtained. This is a very important point to canvassers, and where the large profits with but little effort come in. Try it.

Make all drafts, money orders, and registered letters payable to the order of WESTERN & COMPANY, Publishers, and address all communications,

WESTERN & CO., Publishers,
"The Manufacturer and Builder,"
37 Park Row, New York

NEW LOAN

OF THE

UNITED STATES.

IMPORTANT CIRCULAR.

SUBSCRIPTIONS NOW OPEN—CERTIFICATES READY.

TREASURY DEPARTMENT, WASHINGTON, February 28, 1871.

Public notice is hereby given that books will be opened on the 6th day of March next, in this country and in Europe, for subscriptions to the National Loan, under the act approved July 14, 1870, entitled "An Act to Authorize the Refunding of the National Debt," and the act in amendment thereof, approved January 20, 1871.

The proposed loan comprises three classes of bonds, namely:

FIRST. Bonds to the amount of five hundred millions of dollars, payable in coin, and bearing interest payable quarterly in coin, at the rate of five per cent. per annum.

SECOND. Bonds to the amount of three hundred millions of dollars, payable in coin, at the pleasure of the United States, after fifteen years from the date of their issue, and bearing interest, payable quarterly in coin, at the rate of five per cent per annum.

THIRD. Bonds to the amount of seven hundred millions of dollars, payable in coin, at the pleasure of the United States, after thirty years from the date of their issue, and bearing interest, payable quarterly in coin, at the rate of four per cent. per annum.

Subscriptions to the loan will have preference in the following order, namely:

FIRST. Subscriptions that may be first made for five per cent. bonds to the amount of two hundred millions of dollars; of which there will be reserved, for twenty days, one-half for subscribers in this country, and one-half for subscribers in foreign countries.

SECOND. Subscriptions for equal amounts of each class of bonds.

THIRD. Subscriptions for equal amounts of bonds bearing interest at the rate of four and a half per cent., and of bonds bearing interest at the rate of five per cent.

FOURTH. Subscriptions for any five per cent. bonds that may not be subscribed for in the preceding classes.

When a subscription is made, the subscriber will be required to deposit two per cent. of the amount thereof in coin or currency of the United States, or in bonds of the class to be exchanged, or to be accounted for by the Government when the new bonds are delivered; and payment may be made either in coin or in bonds of the United States, known as FIVE-TWENTY BONDS, at their par value.

The coin received in payment will be applied to the redemption of five-twenty bonds, and the debt of the United States will not be increased by this loan.

The bonds will be registered or issued with coupons, as may be desired by subscribers. Registered bonds will be issued of the denominations of **$50, $100, $500, $1,000, $5,000,** and **$10,000**; and coupon bonds of each denomination except the last two. The interest will be payable in the United States at the office of the Treasurer, and Assistant Treasurer, or Designated Depository of the Government, quarterly, on the first days of February, May, August, and November, in each year.

The bonds of the several classes aforesaid, and the interest thereon, are exempt from the payment of all taxes or dues of the United States, as well as from taxation in any form by or under State, municipal or local authority.

After maturity, the bonds last issued will be first redeemed, by classes and numbers, as may be designated by the Secretary of the Treasury.

The bonds will be issued at the United States Treasury, but the agents for the negotiation of the loan in Europe are authorized to make arrangements with subscribers for the transmission of the bonds to the agents through whom subscriptions may be received.

Subscribers in the United States will receive the new bonds of the agents with whom the subscriptions are made.

In the United States the National Banks are authorized to receive subscriptions, and subscriptions may also be made at the office of the Treasurer of the United States, or of any Assistant Treasurer, or the Designated Depositaries at Buffalo, N. Y.; Chicago, Ill.; Cincinnati, Ohio; Louisville, Ky.; Mobile, Ala.; and Pittsburgh, Penn.

P. S.—This Department and its own Loan Agents are now ready to receive the United States Five-Twenty Bonds and to pay the gold interest thereon to May 1, from which date the new bonds will bear interest. A script certificate, calling for the bonds on the 1st of May, will be issued at once in exchange for the old bonds.

GEORGE S. BOUTWELL,
SECRETARY OF TREASURY.

Progress of Reduction of Public Debt of United States.

	Maximum War Debt, July 31, '65.	Debt at close of last Adm'n., March 1, '69.	Present Outstanding Debt, April 1, 1871.
Five-twenty six per cent stock	$606,569,500	$1,602,587,350	$1,416,088,850
Other six per cent stocks	302,301,042	283,677,400	283,678,100
Ten-forty five per cent stock	172,770,100	194,567,300	194,567 300
Other five per cent. stock	27,022,000	27,022,000	20,000,000
Three-year 7-30 per cent. notes	830,000,000	.....	.....
Three-year six per cent. notes	212,121,470	.....	.....
Total funded	$2,150,784,112	$2,107,854,050	$1,914,344,250
Greenback notes	$473,114 799	$356,021,073	$356,098,621
Greenback certificates	205,822,845	71,140,000	53,493,006
Gold certificates	.....	28,775,560	25,261.460
Fractional currency	25.750,032	36,781,547	40,340,445
Past-due notes and bonds	17,263,120	6 422,464	3,164,502
Total Treasury circulation	$721,950,796	$499,140,644	$478,356,028
Less gold in Treasury	35,337,858	98,741,261	105,697,800
	$686,612,938	$400,399,383	$372,658,228
Less currency balance	81,401,775	16,853,529	18,686,247
Net Treasury circulation	$605,211,163	$383,545,854	$353,971,981
Total principal of debt	$2 755,995,275	$2,491,399,904	$2,268,316,231
Yearly interest, in gold	$64,419,628	$124,255,350	$112,714,982
Yearly interest, in currency	87,412,423	2,134,200	1,621,570
Total amount of interest charge	$151,832,051	$126,389,550	$114,336,552

The results of the above exhibit are as follows:

Principal of debt, 1865	$2,755,995,275
Paid under Johnson	264,595,371
Principal, March 4, 1869	$2,491,399,904
Paid under Grant	223,083,673
Present public debt	$2,268,316,231
Interest charge, 1865	151,832,051
Reduced in four years by payment and funding	25,442,501
Interest charge, 1869	$126,389,550
Reduced in two years by payment	12,052,998
Present interest charge	$114,336,552

The proposed further reduction of the annual interest charge upon the public debt by the funding are as follows:

By exchange of $500,000,000 U. S. 6 per cents. for new five per cents. of 1881	$5,0 0,000
By exchange of $300,000,000 U. S. 6 per cents. for 4½ per cents. of 1886	4,500,000
By exchange of $700,000,000 U. S. 6 per cents. for 4 per cents. of 1901	14,000,000
Total saving per annum by refunding	$23,500,000

C. C. NORVELL,
In Charge Advertising United States Loans.

TREASURER'S OFFICE, New York, April 15.

THE BISHOP GUTTA-PERCHA WORKS,
422, 424 & 426 East 25th St., Office at Factory, New York.

SAMUEL C. BISHOP, Proprietor,

The *only* manufacturer in the United States of every variety of goods, made from *Pure Gutta-Percha.*

SUBMARINE TELEGRAPH CABLES.

Submarine Wires, insulated for Mining and Blasting use.

Telegraph and Electric Wires for office and other uses, of all sizes; Cotton and Silk Covered Wires of all sizes; Bishop's Compound Cordage for air lines and outside connections; Underground Wires, covered with Gutta-Percha and Lead protection; Underground Wires, with fibre and Bishop's Compounds.

Any kind required made to order.

In addition to Telegraph and Electric Goods, I make all kinds of Pure Gutta-Percha goods, such as Belting for use in Water; Sheet for Surgical use; Sheet for various Mechanical uses; Lining for Acid and Chemical Baths; Bottles, Pitchers, and Funnels for Acids; Tissue Sheets for Caps and Hats; Soda and Beer Pipe; Bosses for Flax Machinery, etc., etc.

N. B.—TILLOTSON & CO., 8 Dey street, New York, and BLISS, TILLOTSON & CO., 247 South Water street, Chicago, are General Agents for the sale of any Telegraph and Electric Goods made by me, at Factory prices.

JOHN THORNLEY, 503 Chestnut street, Philadelphia, Pa., is Agent for the sale of any goods made by me at Factory prices.

☞ Orders also received at Factory for all kinds made.

Any goods of my manufacture, "excepting Telegraph and Electric Goods," are for sale in New York, by H. G. NORTON & CO., 26 Park Place; RUBBER CLOTHING Co., 247 Broadway; D. HODGMAN, 27 Maiden Lane, New York. sep13:4m

CHARLES A. BROWNE & BROTHER,
NORTH ADAMS, MASS.
MANUFACTURERS
OF
PATENT ELECTRIC FUSE, &c.—ALL THE ELECTRIC FUSES USED UPON THE HOOSAC TUNNEL.
FOR
EXPLODING NITRO-GLYCERINE, DUALIN AND POWDER,
Are manufactured by us. Send for circular.

HOOSAC TUNNEL NITRO-GLYCERINE WORKS.
Tri-Nitro-Glycerine, Electric Fuse Exploders, Pure Gutta Percha Insulated Wire.

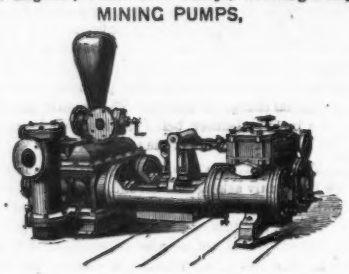
The Tri-Nitro-Glycerine manufactured under the Mowbray Patents is safer to handle, has 30 per cent. more plosive force, and is a more stable compound, than can be made by the Nobel Process. Our fuses are safe to handle and are sure fire. We purify our own Gum Gutta Percha, and insulate copper wire with machinery (the result of many years' investigation), with the sole view to render blasting with Nitro-Glycerine perfectly safe and 50 per cent. cheaper than with powder. Proved to have double the force in blasting over Dualin, Dynamite, and other adulterations of inferior Nitro-Glycerine with inert matter.

PATENTS—No. 76,499, April 7, 1868. No. 96,465, Nov. 2, 1869.
No. 93,113, July 20, 1869 No. 106,606, Aug. 23. 1870. Address GEORGE N. MOWBRAY,
No. 94,969, Sept. 21, 1869 No. 106,607, Aug. 23, 1870. NORTH ADAMS, MASS.
[Feb. 21, 3m.]

Advertisements.

Advertisements admitted on this page at the rate of **40** *cents per line. Engravings may head advertisements at the same rate per line, by measurement, as the letter press.*

HYDRAULIC WORKS.
MANUFACTORY,
BROOKLYN, N. Y.
Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps,
MINING PUMPS,



Water Meters, Oil Meters; Water Pressure Engine Stamp Mills for Gold, Silver and Copper Ore; Eaton's Gatent Amalgamators for Gold and Silver; Steam and Gas Pipe, Valves, Fittings, etc. Iron and Brass Casting
☞ Send for Circular.
H. R. WORTHINGTON,
feb1-1y 61 Beekman street, New York.

LAFLIN & RAND,
POWDER CO., 21 Park Row, opposite Astor House, New York,
invite attention to their facilities for delivering
BLASTING POWDER,
SAFETY FUSE,
ELECTRICAL BLASTING
APPARATUS, &c.,
wherever required, from having nine manufactories in different States, beside agencies and magazines at all distributing points. nov. 1:1y

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PATENT
DUALIN.
NEW EXPLOSIVE,
EQUAL IN STRENGTH TO NITRO-GLYCERINE.
SAFER THAN GUN-POWDER.
Factory and Office, Neponset, Mass.
march:21:3m

E. Allen & Co's
NEW MODEL
Cartridge Revolver.
Weight only 6 oz. Can be carried in the vest pocket. Seven Shots; 22-100 calibre. Lightest and best Revolver in the world.
Address, ETHAN ALLEN & CO.
WORCESTER, Mass.
6m

FOR SALE.
A RARE AND EXTENSIVE CABINET
OF
MINERALS
AND
FOSSILS.
Comprising choice specimens of ores from most of the celebrated producing mines of North America—the result of many years of careful selection. This cabinet cannot be duplicated. Can be seen at No 5 Dey street, Room 9. a:18:2t

A. BESSELL.
PLUMBAGO & PLUMBAGO CRUCIBLES.
WORKS,
DRESDEN, SAXONY, GERMANY.

MOUNT SAVAGE
FIRE BRICK
GOVERNMENT STANDARD.
Manufactured by the
Mount Savage Fire Brick and Mining Company.
This Company having acquired the Fire Clay properties and Brick Works of the
Consolidation Coal Company,
will receive orders for their unequalled FIRE BRICK for Blast, Puddling, Smelting and Glass furnaces. Diagrams of shapes and prices will be furnished on application to
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JAMES A. MILLHOLLAND, Vice Pres.,
Dec. 7.tf Mount Savage, Maryland.

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